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DECEMBER 2, 1929-JULY 3, 1930

SENATE DOCUMENTS

VOL. 26

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1930

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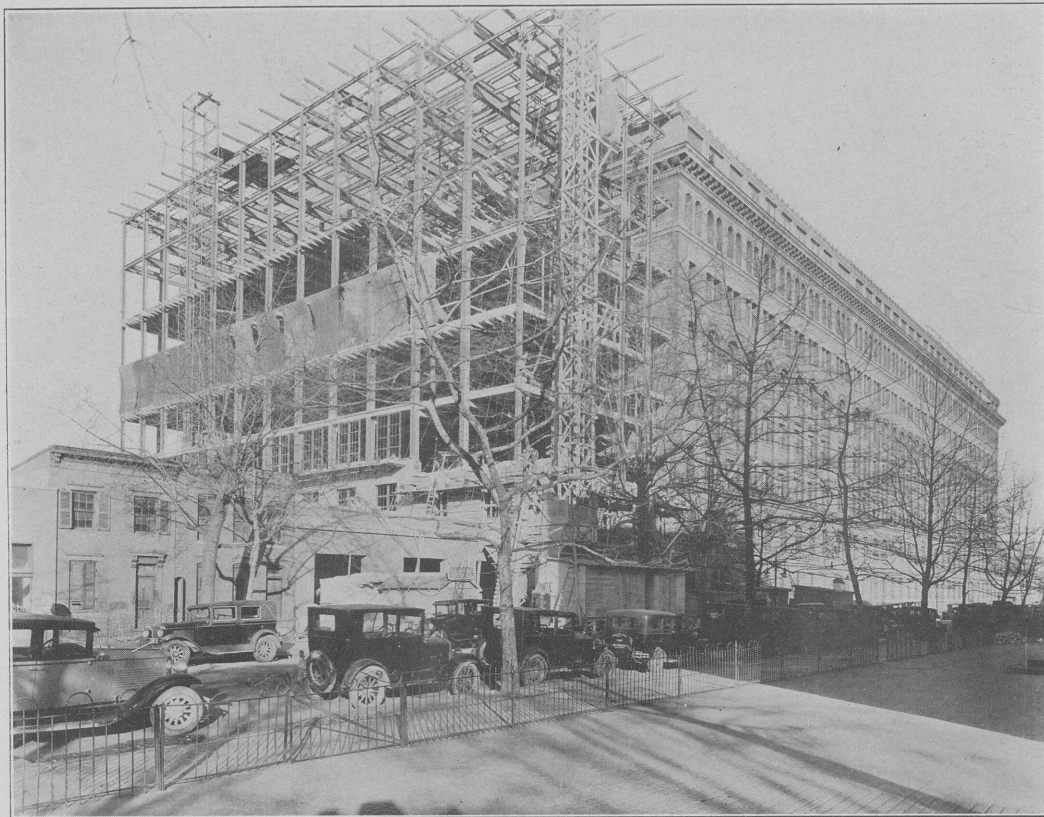
UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1930

ANNUAL REPORT

OF THE

PUBLIC PRINTER

1929



UNITED STATES GOVERNMENT PRINTING OFFICE

G Street view of Main Building December 26, 1929, showing construction of the new 8-story extension
and 1-story garage at the left

UNITED STATES GOVERNMENT PRINTING OFFICE

GEORGE H. CARTER, Public Printer

ANNUAL REPORT OF THE PUBLIC PRINTER

1929



UNITED STATES

GOVERNMENT PRINTING OFFICE

WASHINGTON : 1930

UNITED STATES GOVERNMENT PRINTING OFFICE

Public Printer.—GEORGE H. CARTER, Iowa

Deputy Public Printer.—JOHN GREENE, Massachusetts.

Production Manager.—ELLWOOD S. MOORHEAD, Pennsylvania.

Assistant to Public Printer.—MISS MARY A. TATE, Tennessee.

Chief Clerk.—HENRY H. WRIGHT, New York.

Assistant Chief Clerk.—ERNEST C. MELLOR, Maryland.

Superintendent of Accounts and Budget Officer.—JAMES K. WALLACE, Ohio.

Assistant Superintendent of Accounts.—J. THOMAS FORD, Nevada.

Purchasing Agent.—ERNEST E. EMERSON, Maryland.

Assistant Purchasing Agent.—WILLIAM J. CASSIDAY, District of Columbia.

Superintendent of Documents.—ALTON P. TISDEL, Ohio.

Assistant Superintendent of Documents.—MISS JOSEPHINE G. ADAMS, District of Columbia.

Superintendent of Planning.—WILLIAM A. MITCHELL, North Carolina.

Assistant Superintendent of Planning.—LOUIS C. VOGT, Florida.

Storekeeper and Traffic Manager.—WILLIAM H. KERVIN, New York.

Assistant Storekeeper.—GEORGE LAMB, Pennsylvania.

Medical and Sanitary Officer.—DR. DANIEL P. BUSH, Nebraska.

Assistant Medical and Sanitary Officer.—DR. ARTHUR G. HUNT, Oklahoma.

Technical Director.—EDWARD O. REED, District of Columbia. (Resigned October 15, 1929.)
BYRON L. WEHMHOF, Washington. (Appointed October 16, 1929.)

Disbursing Clerk.—EDWARD J. WILVER, Pennsylvania.

Deputy Disbursing Clerk.—J. BASIL PERKINS, Minnesota.

Chief Instructor of Apprentices.—BURR G. WILLIAMS, Iowa.

Assistant Chief Instructor of Apprentices.—NATHANIEL G. WATTS, Missouri.

Assistant Chief Instructor of Apprentices.—FRANK M. ROLLER, Pennsylvania.

Congressional Record Clerk (Capitol).—WILLIAM A. SMITH, District of Columbia.

Superintendent of Printing.—HERMANN B. BARNHART, Indiana.

Assistant Superintendent of Printing.—MAURICE H. PHILLIPS, Ohio.

Foreman Linotype Section.—WILLIAM D. SKEEN, Pennsylvania.

Foreman Monotype Section.—WILLIAM H. CHASE, Maryland.

Foreman Proof Section.—MARION E. BULLOCK, Maryland.

Foreman Patents Section.—RAYMOND H. LECRAW, Rhode Island.

Foreman Hand Section.—HUGH REID, Wisconsin.

Foreman Job Section.—ALLAN C. CLOUGH, New Hampshire.

Foreman Library Printing Branch.—JAMES H. HESLET, Kansas.

Chief Type Machinist.—DANIEL L. LIDDLE, Michigan.

Superintendent of Presswork.—BERT E. BAIR, Michigan.

Assistant Superintendent of Presswork.—DANIEL BECKWITH, New Hampshire.

Foreman Main Press Section.—DANIEL I. LEANE, New York.

Foreman Job Press Section.—JAMES E. VEATCH, New York.

Foreman Postal Card Section.—JOSEPH A. FENTON, Michigan.

Foreman Money Order Section.—JOHN A. MASSEY, Jr., Georgia.

Superintendent of Binding.—MARTIN R. SPEELMAN, Missouri.

Assistant Superintendent of Binding (Book Section).—JOHN A. PATTERSON, New York.

Foreman Pamphlet Section.—CHARLES J. OREM, Maryland.

Foreman Blank Section.—WALTER H. OLIVER, Maine.

Foreman Library Binding Branch.—GEORGE R. ERLER, Maryland.

Superintendent of Platemaking.—EDWARD G. WHALL, Massachusetts.

Assistant Superintendent of Platemaking.—EDWARD A. KERR, Massachusetts.

Foreman Finishing Section.—CHARLES H. HANSON, Pennsylvania.

Foreman Photo-Engraving Section.—JOHN WALTER, Maryland.

Night Assistant Production Manager.—EDWARD A. HUSE, Massachusetts.

Assistant Superintendent Presswork, night.—CHARLES C. GASTROCK, Pennsylvania.

Foreman Linotype Section, night.—HARRY L. MURRAY, Pennsylvania.

Foreman Monotype Section, night.—WILLIAM A. MORRIS, Missouri.

Foreman Proof Section, night.—HARRY B. GOODRELL, Iowa.

Foreman Hand Section, night.—GEORGE O. ATKINSON, Massachusetts.

Assistant Foreman Pamphlet Section, night.—CHARLES C. COVERT, New York.

In Charge Platemaking, night.—HERMAN C. GROTH, Pennsylvania.

Superintendent of Construction and Maintenance.—ALFRED E. HANSON, Massachusetts.

Chief Carpenter.—ABRAHAM B. BATTON, Maryland.

Chief Machinist.—MICHAEL J. MCINERNEY, New York.

Chief Electrician.—EDWARD H. BRIAN, District of Columbia.

Chief Engineer.—WALTER A. BROWNE, New Hampshire.

Chief Pipefitter.—OVLUP H. GEORGE, New York.

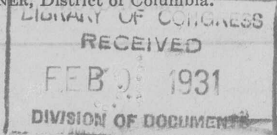
Assistant Structural Engineer.—EDWARD F. WEBB, Illinois.

Construction Foreman.—DANIEL W. BRUCE, District of Columbia.

Foreman Sanitary Section.—JOSEPH L. MAY, Virginia.

Chief of Delivery.—WALTER G. COPP, District of Columbia.

Captain of Guards.—CHARLES H. WARNER, District of Columbia.



ANNUAL REPORT OF THE PUBLIC PRINTER

UNITED STATES GOVERNMENT PRINTING OFFICE,
OFFICE OF THE PUBLIC PRINTER,
Washington, D. C., January 10, 1930.

To the Congress of the United States:

In compliance with law, I have the honor to submit the following report on the work of the Government Printing Office for the fiscal year ended June 30, 1929, and also for the last half of the calendar year 1929.

Completing the first decade since the World War, it seems appropriate to begin this report with a brief review of the work of the Government Printing Office during the outstanding fiscal years 1919 and 1929, which mark the high tide of its war and peace time activities.

On almost every basis of comparison, the record of the Government Printing Office for the year ended June 30, 1929, surpasses the war peak in the fiscal year 1919, heretofore regarded as the banner year for the production of Government printing and binding.

THOUSAND FEWER EMPLOYEES IN OFFICE

With 1,068 fewer employees than were enrolled in 1919, the new record in 1929 was achieved after a thorough reequipment and rehabilitation of the entire plant which the exhausting war work made necessary.

In 1919 the Government Printing Office had an average daily enrollment of 5,042 employees, with a maximum at one time of 5,307. In 1929 the average daily enrollment was 3,974, exclusive of the 180 apprentices.

The present number of employees in the Government Printing Office is greater than either the State, War, Justice, Post Office, Interior, or Labor Department has in Washington, and more than any independent establishment except the Veterans' Bureau.

COMPENSATION INCREASE NEARLY \$1,500,000

The total compensation of the 4,154 employees, including apprentices, in 1929 exceeded that paid the 5,042 employees in 1919 by

nearly \$1,500,000, the total compensation for 1919 being \$7,357,973.90 and for 1929, \$8,821,369.65. This increase of 20 per cent in the total of wages and salaries for 1929 was paid to 20 per cent fewer employees.

The average wage, including bonus, in 1919 was \$1,459.33. The average wage in 1929 was \$2,123.58, an increase of 45 per cent, or \$664.25 more per employee than in 1919. The higher wages were made possible by the Kiess Collective Bargaining Act of 1924, which aided materially in obtaining the increased production of recent years and the record-breaking output for 1929.

The work of the more competent and contented force of employees has been made easier by the extensive installation of more efficient machinery and equipment and by the general improvement of working conditions in the office during the last eight years.

HIGHER AVERAGES OF TYPE-MACHINE OPERATORS

An example of the increased efficiency, typical of the entire force, is the work of linotype and monotype keyboard operators, whose production averages have increased nearly 40 per cent. In 1919 Government linotype operators produced an average of 3,620 ems of type per hour, while in 1929 their average was 5,056, an increase of 1,436 ems per hour. Likewise in 1919, monotype keyboard operators had an average of 5,002 ems of type per hour, while their average in 1929 was 7,148, an increase of 2,146 ems per hour.

The increase of operators' averages brought the total number of ems of type set in 1929 up to 2,226,741,000, or within 11 per cent of the total composition in the record-breaking year of 1919, when a larger force, working 12 or more hours daily, was credited with 2,492,564,700 ems of type. Of the 1919 type, 385,729,700 ems were "pick-up" or set on time, 120,845,100 more ems of "pick-up" and time work than in 1929, not including the work of apprentices.

Deducting the "pick-up," which was largely a double credit for composition previously charged, approximately 150,000,000 more ems were produced by the type-machine operators in 1919 than in 1929. That represents less than three weeks' output of the present force at normal hours.

NO LET-UP IN WORK AFTER THE WAR

For a better understanding of this comparison of the years 1919 and 1929 the following statement of the work of the Government Printing Office in 1919 is quoted from the Report of Public Printer Ford for that year:

The signing of the armistice on November 11, 1918, found this office in full swing on the largest output in its history. With practically all divisions running on three 8-hour schedules, the value of product was amounting to about one and a quarter million dollars a month. A decided let-up was apparent for

a while after that time, due to cancellation of many orders covering large quantities of printing for war purposes. This let-up, however, was for but a short time; work that had been held back by various departments during the war period was sent in, and printing in connection with collection of revenue, Liberty bonds, and other activities brought about during the war was of such volume that the extremely large output continued throughout the year.

The value of work produced was the largest of any year since the establishment of the Government Printing Office, and the largest number of employees was 5,307, in October, 1918.

Notwithstanding the vast production of war-time printing and binding in 1919, the much smaller force in 1929 established higher records for nearly every class of work done by the Government Printing Office.

NUMBER OF PRINTING JOBS INCREASED

The number of job specifications (jackets) written in 1929 was 58,860, an increase of 2,521, or 4 per cent more than in 1919. Greater care was taken in figuring on these jobs, as shown by the fact that 15,203, or 39 per cent, more estimates on printing and binding requisitions were prepared in 1929 than in 1919.

The extent of accounting required is further shown by the fact that 75,919 bills for work done in 1929 were computed and rendered to the various departments and establishments of the Government, an increase of 8 per cent over the number of bills computed in 1919.

The total cost of printing and binding produced in the fiscal year 1929 was \$13,515,330.80, which was \$740,618.46, or 6 per cent, more than for the work done in the war year ended June 30, 1919.

Of the charges for 1929, paper and envelopes constituted 18 per cent, while in 1919 these items amounted to 36 per cent of the total charges. The high price of materials during the war is shown by the fact that paper and envelopes used in the fiscal year 1919 cost \$4,591,394.89, as compared with \$1,956,956.22 paid in 1929 for approximately the same quantity.

MORE PRODUCTION THAN IN WAR TIME

Although, as before stated, the amount of type set in 1929 was somewhat less than that reported for 1919, there are other records showing more work actually accomplished in the fiscal year 1929 than at the height of the war-time production. For example, a comparison of the number of type pages for the two years 1919 and 1929 shows an increase of 899,455, or 65 per cent, for the latter year, with a total of 2,274,889 type pages, as against 1,375,434 in 1919.

Patent specifications and trade-marks increased 30 per cent, from 117,694 type pages in 1919 to 153,316 pages in 1929. There were 5,689,408 copies of patent specifications and trade-marks printed in 1929. The number in 1919 is not known but was considerably less.

Type pages of bills, resolutions, and amendments printed for Congress increased from 58,217 in 1919 to 94,157 in 1929, a growth of 62 per cent in this class of printing.

COPIES PRINTED BREAK THE RECORD

Likewise, the 3,402,131,586 copies of all classes of work printed in the fiscal year 1929 exceeded the total number of copies recorded in 1919 by approximately 450,000,000, or 15 per cent. The increase was due largely to the greater number of blanks, notices, schedules, and cards printed in 1929, reaching the record-breaking total of 3,167,101,247 copies, which was 686,539,698, or 28 per cent, more than in 1919.

Of postal cards alone, 1,820,181,228 were printed in 1929, as compared with a total in 1919 of only 271,929,600, or approximately one and one-half billion less than in 1929.

The printing of postal money orders also reflects a great growth in business, with totals of 120,560,000 for 1919 and 208,161,400 for 1929, the increase during the latter year being 87,601,400.

PRESSWORK AND BINDERY PRODUCTION

With 220 fewer employees in 1929, the presswork division completed but a third less impressions than were produced in 1919, when the force consisted of three shifts of eight hours each. Presswork in 1919 consisted largely of continuous runs of drill manuals, Army regulations, and war handbooks, while in 1929 a far greater variety of larger publications was printed.

The bindery division with 1,771 employees in 1919 had almost double the number on its rolls in 1929. Nevertheless, with only 910 employees, the bindery record for several operations in 1929 exceeds that of 1919, due to the recent installation of more efficient machinery. With practically the same number of folding machines of a newer and more productive model, sheets of printed paper folded in 1929 increased 107,611,621, or 40 per cent, over 1919. Copies of publications paper covered by machinery increased 1,407,034, or 15 per cent.

SALES OF GOVERNMENT PUBLICATIONS

The passing of the war period is also noticeable in the largely increased sale of Government publications. During the peace-time year of 1929 the Superintendent of Documents sold 4,425,491 more copies of publications than in 1919. A total of 9,208,148 copies were sold in 1929. The receipts from the sale of publications in 1929 amounted to \$505,062.42 more than for 1919, when the total receipts

were \$200,739.99. The documents division in 1929 also handled 327,414 more cash orders and 78,439 more letters of inquiry than in 1919.

Applying the 1919-1929 comparison to plant construction and maintenance work, the trend of improvement is also seen in the increase of \$154,446.06 for work completed in 1929, the total value of which was \$339,273.93. The increased construction and maintenance work in 1929 was done by seven fewer employees than in 1919.

So it is evident that in nearly every way the Government Printing Office to-day is doing more work with fewer employees than in 1919 when the war production reached its peak and was thought to have set records that would stand for many years.

FINANCIAL ACCOMPLISHMENTS OF YEAR

The records of 1929 likewise show satisfactory advances over the preceding fiscal year 1928, both in productive and financial accomplishments. The charges for work done in 1929 increased \$345,184.17 over the previous year, exclusive of \$800,000 expended for labor and material on jobs that were not computed at the end of the fiscal year. The total charges for the year amounted to \$12,715,330.80.

Charges for work delivered in the fiscal year 1929 exceeded the cost by \$428,836.74, or 3 per cent, which was approximately the amount of the unobligated balance returned to the Treasury in 1929 for other use by the Government.

Inasmuch as the charges are based on a scale of prices which has to be fixed in advance according to previously determined costs, the variation of only 3 per cent in the total charges and costs for the current year is a remarkably close margin on which to balance the accounts of the year, amounting to approximately \$13,000,000.

CHARGES FOR WORK AT ACTUAL COST

The financial problem is especially difficult under the law requiring work to be done at cost, which necessitates charges of as nearly an equal amount as possible so as to avoid deficiencies prohibited by law. Thus, the Public Printer can neither make a profit nor incur a loss in the work of the Government Printing Office. If the departments exhaust their printing funds, no work can be done for them, but the Public Printer must then curtail his expenditures and force of employees accordingly. Fortunately, a furlough has not been necessary on this account for a number of years.

The unobligated balance of Government Printing Office appropriations for 1929 was \$407,436.36, which was six times the reserve

pledged to the Bureau of the Budget at the beginning of the fiscal year and represents savings in funds that were available for expenditure by the Public Printer.

In addition to the large unexpended balance, the Public Printer also deposited in the Treasury to the credit of miscellaneous receipts during 1929 the sum of \$170,389.84, obtained from the sale of waste materials and public documents.

SAVINGS IN NINE YEARS, \$10,077,756.45

The unobligated balance and deposit of miscellaneous receipts in 1929 bring the total of unused funds returned to the Treasury by the present Public Printer during the last nine fiscal years to the grand total of \$10,077,756.45.

In the 1929 audit of Government Printing Office expenditures for the year, the Comptroller General made only one disallowance, a \$3 item which had been paid through mistake.

During the nine fiscal years for which the present Public Printer has had to account for the expenditure of \$110,011,627.45, the total disallowances have amounted to \$1,131.47. All of this sum has been deposited in the Treasury, \$507.39 by contractors, \$452.13 by reinstated employees who had to refund leave pay, and \$171.95 from miscellaneous sources.

PURCHASE OF MACHINERY AND SUPPLIES

The expenditures for the fiscal year 1929 required the placing of 6,328 orders for equipment, machinery, material, and supplies, costing approximately \$3,900,000, of which \$2,958,738.59 was for paper and envelopes and \$196,225 for machinery. By possible economies in the handling of these orders, the purchasing agent reported a saving of \$21,479.10. Savings by cash discounts on purchases during the year amounted to \$2,004.86.

Among the purchases during the year were blank paper and envelopes procured for other departments and establishments of the Government and for the District of Columbia to the amount of \$535,417.89.

The vast purchases of paper, materials, machinery, and equipment for the Government Printing Office in the fiscal year 1929 are shown by the receipts of 1,277 full carload lots and 1,154 less-than-carload lots, totaling in all approximately 50,000,000 pounds. Practically all these shipments were handled in Washington by the 29 motor trucks operated by this office. The unloading and hauling was done so promptly that the railroads did not charge any car demurrage against this office during the year.

IMMENSE DELIVERIES BY OFFICE TRUCKS

In addition to hauling all of these shipments, the motor trucks of the Government Printing Office made 108,430 deliveries of its products to the Capitol and other Government buildings in Washington, the total tonnage of these deliveries amounting to approximately 45,000,000 pounds. The total mileage of the trucks for the year was 88,523.

Expenditures for wages and salaries for an average enrollment of 4,154 employees in the fiscal year 1929 amounted to \$8,821,369.65, or \$279,763.84 more than in 1928. Of their earnings in 1929, employees paid into the Federal retirement fund the sum of \$325,350.67, which is obtained by deducting for Treasury deposit $3\frac{1}{2}$ per cent of their compensation.

Included in the expenditures for wages and salaries was \$156,319.55 for overtime, Sunday, and holiday work, an increase of \$51,451.72 over the preceding year, but \$147,154.28 less than was paid for overtime work in 1920, the year preceding the present administration of this office.

RATES OF PAY FOR THE SKILLED TRADES

The present annual rates of pay (not including overtime) for the skilled trades in the Government Printing Office are as follows:

Compositors, bookbinders, and platen pressmen, \$2,504 a year, at \$1 per hour; compositors, typesetting-machine operators, and book-binder-machine operators, \$2,629.20 a year, at \$1.05 per hour; typesetting-machine operators, proof readers, stereotypers, cylinder pressmen, machinists, carpenters, painters, electricians, and pipe fitters, \$2,754.40 a year, at \$1.10 per hour; typesetting-machine operators, \$2,879.60 a year, at \$1.15 per hour; photo-engravers, \$3,004.80 a year, at \$1.20 per hour.

The minimum wage for skilled laborers is \$1,377.20 a year, at 55 cents per hour.

Bindery operatives and similar grades of employees are paid from \$1,377.20 to \$1,878 a year, at rates ranging from 55 to 75 cents per hour.

The average pay for employees in 1929 was \$2,123.58, an increase of about \$23 over the previous year, due to readjustment of individual rates of pay. No new wage scales were negotiated during the year under the Kiess Act of 1924.

COST OF ANNUAL LEAVE AND HOLIDAYS

Annual leaves of absence and holidays in the fiscal year 1929 cost the Government Printing Office the sum of \$1,270,504.79, all of which was paid to employees for nonworking time and included

in charges for work, as required by law. In addition to 30 days' annual leave with pay, employees enjoyed 8 legal holidays and by Executive order are granted Saturday half holidays during 4 months of the year.

A bill granting employees of the Government Printing Office extra pay or equivalent time off for working any Saturday afternoon throughout the year has passed the Senate and is now pending in the House of Representatives. If the bill insured employees an actual half day of rest on Saturdays, the Public Printer would heartily favor it, but the pending legislation will not accomplish that purpose and therefore would be of little benefit to employees except as to extra pay for working Saturday afternoons.

The Government Printing Office can not shut down for Saturday half holidays throughout the year unless Congress and the executive departments do likewise or cease to require this office to work on such half holidays. This is a matter for Congress and the President to determine.

INCREASES IN NEARLY EVERY OPERATION

Increases were made in nearly every operation of the office during the fiscal year 1929. Composition increased 125,440,000 ems, with a total of 2,226,741,000, or 6 per cent more than in 1928. Chargeable impressions increased 289,094,890, with a total of 2,225,320,830. The actual impressions for the year numbered 512,438,770, which was 15,745,150 more than in the preceding year. The production of electrotypes and stereotype plates increased 475,436 square inches, with a total of 10,820,451 square inches.

The largest gain of the bindery was in machine ruling, which increased nearly 15 per cent. During the year, 26,869,442 sheets passed through the ruling machines, an increase of 4,002,023 over 1928. The number of copies on the ruled sheets totaled 96,102,929, which was 47,091,072, or 98 per cent, more than the copies ruled in 1928. The increase was due largely to the greater demand for ruled blank books and to the operation of a new disk ruling machine.

Tablet making increased 22 per cent, with a total of 3,573,051, or 644,721 more tablets than were made in 1928. There was likewise an increase in index cutting and edging of books by approximately 50 per cent.

WORK OF BINDERY DURING THE YEAR

Other bindery operations during the year 1929 included 378,361,054 sheets folded, 154,190,077 signatures gathered, 58,600,715 signa-

tures sewed, 45,017,086 copies wire stitched, 44,992,890 books and pamphlets trimmed, 10,547,504 copies paper covered, and 1,668,704 books cloth covered.

The grand total of all classes of printed work in the fiscal year 1929 exceeded that of 1928 by 60,437,283 copies. The output for 1929 was 3,402,131,586 copies, of which 3,167,101,247 were blanks, notices, schedules, and cards, including postal cards.

Type pages for all the printing of 1929 totaled 2,274,889, an increase of 234,430, or 11 per cent more pages than in 1928. The number of copies bound in 1929 decreased 155,199, with a total of 1,148,339 for the year.

There were 2,509,338 more copies of books and pamphlets of various sizes printed in the fiscal year 1929 than in the preceding year, the total being 99,270,932 copies. These publications contained 1,984,364 type pages, an increase of 220,469 pages over 1928.

REDUCTION IN LETTERHEADS AND ENVELOPES

Letterheads and envelopes printed during the fiscal year 1929 totaled 115,386,978, a decrease of 3,516,863 from 1928.

Only 757,161 letterheads and envelopes were embossed in 1929 at a cost of \$6,903.53. When Members and committees of Congress were permitted to order all the embossed stationery they desired at the expense of the Government the cost amounted to about \$60,000 for more than 12,000,000 embossed letterheads and envelopes supplied each year. In 1913 the Joint Committee on Printing put a stop to the free supply of embossed stationery and since then Members have had to pay for the comparatively small quantity now ordered for their personal use. The action of the joint committee has saved the Government far more than half a million dollars in the last 16 years.

By adopting some years ago one standard size, 8 by 10½ inches, for Government letterheads, instead of using the commercial size of 8½ by 11 inches, an annual saving of approximately \$50,000 in paper alone has been effected. Practically all letterheads are printed on standard 30 or 50 per cent rag paper. Envelopes stocked by this office for printing are now of four standard sizes, replacing nearly a dozen different sizes formerly used.

In addition to the letterheads and envelopes printed by the Government Printing Office, vast quantities are printed by various departments with their own presses, and more than 200,000,000 official "penalty" envelopes are procured by contracts awarded by the Post Office Department.

The Government Printing Office has nothing whatever to do with the printing of stamped envelopes sold to the public by the Post Office Department, which has this work done elsewhere by contract.

MANUFACTURE OF BLANK BOOKS

Blank books were produced in the fiscal year 1929 to the number of 2,954,567, an increase of 492,335 over the output for the preceding year.

The making of blank books has been a function of the Government Printing Office for many years; in fact, the printing act of 1895 requires that, in addition to printing and binding, "all blank-book work shall be done at the Government Printing Office," and Congress repeated this provision in the act of March 1, 1919. Notwithstanding the law, it was the practice of many officers of the Government to procure blank books elsewhere under contracts which in recent years were awarded by the General Supply Committee. However, two years ago the Joint Committee on Printing insisted that all blank-book work should be done at the Government Printing Office according to law. The Comptroller General also decided that blank books must be procured exclusively from the Public Printer.

STOCK OF STANDARD BLANK BOOKS

The Public Printer therefore prepared to standardize and stock certain kinds of blank books. The departments were notified on April 1, 1927, that the Government Printing Office had started to make stenographer's notebooks in four sizes to be stocked in quantities for immediate delivery at prices comparable with those quoted by the General Supply Committee.

This led to a more detailed study of Government blank books by the executive committee of the Permanent Conference on Printing with a view to standardizing and reducing many of the varieties that had been procured by contract. The committee reported that 375 specifications for blank books were included in the general schedule of contract supplies for 1928, with an average of 62 different books for each specified dimension. The contract schedule listed blank books of 6 dimensions, 5 styles of rulings, and 3 styles of indexing for books varying in pages from 150 to 500 each.

Working in cooperation with the Chief Coordinator and the Public Printer, the Permanent Conference on Printing recommended and secured the adoption of 19 standard blank books, to be made by the Government Printing Office, in place of the 375 varieties contracted for by the General Supply Committee.

SUPPLY CENTRALIZED BY CONGRESS

The standardization of blank books was materially aided by Congress in the act of February 28, 1929, which provides that blank-book work which can not be done at the Government Printing Office may be procured by contracts awarded by the Public Printer. This legislation was recommended by the Public Printer to place the supply of Government blank books under one head, whether produced by the Government Printing Office or procured elsewhere, so that they could be made economically in large quantities and according to approved standards. As a result, a large number of useless varieties have been eliminated, and the great bulk of Government blank books is now supplied from stock according to standard schedules issued annually by the Public Printer.

During 1929, the first year of this undertaking, there were issued from the stocks on hand in the Government Printing Office 286,518 standard notebooks for stenographers and 160,894 standard blank books.

STANDARDIZATION OF BLANK FORMS

The standardization of blank forms also has been aided by the Public Printer in the printing and stocking of large quantities of the forms prescribed for Government use. During the fiscal year 1929 the Government Printing Office stocked 9,411,135 copies of standard and common forms, for which this office assumed the initial expense of printing, to be subsequently charged to the ordering departments. The forms in stock include 120 standardized by the Bureau of the Budget and the Comptroller General, 10 adopted by the Personnel Classification Board and the Bureau of Efficiency for common use in the Government service, and 12 required for Government freight transportation. Of the transportation forms 949,618 were issued by this office in 1929.

All forms proposed for standardization by the Bureau of the Budget are submitted to the Permanent Conference on Printing for its recommendation as to paper and typography and when sanctioned by the Director of the Budget are promulgated with the approval of the President. Likewise, General Accounting Office forms are submitted by the Comptroller General to the Permanent Conference on Printing for similar views as to paper and typography. All forms so approved are not subject to alteration thereafter except by the same procedure.

The standardization of forms has greatly decreased the number and variety of blanks used by various departments and establish-

ments and has effected much-needed uniformity in the transaction of Government business as well as materially reducing the cost of printing.

WORK OF THE REQUISITIONS REVIEW BOARD

Economies effected by the requisitions review board during the fiscal year 1929 amounted to \$14,152.84, due to careful review of all requisitions for printing and binding submitted by the various departments and establishments. Since the review board was created by the Public Printer on July 25, 1921, with the approval of General Dawes, then Director of the Bureau of the Budget, it has reported a total savings to the departments of \$375,681.70 in revising their requisitions for printing so as to secure more economical production.

The requisitions review board is an important part of the planning division in the Government Printing Office, and its work has been well done. The mere knowledge that such a board is always on the watch for economies has also prompted more careful preparation of printing requisitions by other branches of the Government that are now carrying on of their own accord many of the savings which were initiated by the review board. Its opportunities for economies have, therefore, decreased considerably, but the report for 1929 shows that the board is still functioning.

TABULATING CARDS UNDER PUBLIC PRINTER

The controversy in regard to the printing of tabulating cards as discussed at length in the Public Printer's report for 1928 has been settled by Congress in the act of February 28, 1929, which sustains and strengthens the right of the Public Printer to furnish tabulating cards, either by printing the cards in the Government Printing Office or by contracting for them to be produced elsewhere. This legislation, which was recommended by the Public Printer and promptly enacted by Congress, reads as follows, quoting from page 16 of Public Act No. 844, Seventieth Congress:

* * * hereafter such printing, binding, and blank-book work authorized by law, as the Public Printer is not able or equipped to do at the Government Printing Office, may be produced elsewhere under contracts made by him with the approval of the Joint Committee on Printing.

Congress had previously provided in the acts of January 12, 1895, and March 1, 1919, that all printing, binding, and blank-book work, except for certain field services, shall be done at the Government Printing Office.

However, the Comptroller General decided that the acts of Congress did not apply in case the Government Printing Office was un-

able to print tabulating cards to his satisfaction and that the Public Printer had no right to contract for work which the Government Printing Office was not able or equipped to do.

On the other hand, the Public Printer contended that the question of how work shall be done for the Government Printing Office, whether by its own or another's equipment, was an administrative function solely within the jurisdiction of the Public Printer as the head of an independent establishment of the Government.

CONGRESS UPHOLDS THE PUBLIC PRINTER

Inasmuch as there was no other appeal from the decision of the Comptroller General, the Public Printer in his 1928 report submitted the matter to Congress for final determination. The decision rendered by Congress, as expressed in the act of February 28, 1929, gives full and final authority to the Public Printer to have printing, binding, and blank-book work either done in the Government Printing Office or, if that office is not able or equipped to do so, to purchase such work elsewhere under contracts approved by the Joint Committee on Printing.

Accordingly, the Public Printer has resumed the printing of tabulating cards and is also contracting for such cards as the Government Printing Office is at present not able or equipped to produce.

The Comptroller General in recent decisions has sustained the right of the Public Printer to print or contract for tabulating cards under the acts of March 1, 1919, and February 28, 1929. The views of the Comptroller General are expressed in his decision (A-27572) of June 29, 1929, as follows:

Tabulating cards when printed on order to meet the needs of particular Government services constitute printing within the meaning of that term as used in the act of March 1, 1919 (40 Stat. 1270). The Congress has by the cited act of 1929 authorized the Public Printer to procure elsewhere, under contract made by him, such printing, binding, and blank-book work as he is not able or equipped to do at the Government Printing Office, and there appears to be no alternative but to order from the Public Printer all tabulating cards required for the needs of your commission. The responsibility of furnishing satisfactory cards, whether printed in the Government Printing Office or obtained elsewhere under contracts made by the Public Printer, is that of the Public Printer.

It being mandatory to procure the tabulating cards from the Public Printer, there is no authority to enter into a lease for tabulating machines which restricts the cards to be used in such machines to those furnished by the lessor or "manufactured" or made by the Public Printer. This restriction should either be entirely omitted from the lease or amended to permit the use of cards "manufactured or contracted for by the Public Printer."

TABULATING CARDS FOR CENSUS BUREAU

Another effort to prevent the Public Printer from printing or contracting for tabulating cards was made by the Director of the Census in the census bill, which, as reported to the Senate on April 23, 1929, contained the following amendment:

Provided, however, That punch cards shall not be considered as printing within the meaning of this section.

Upon protest by the Public Printer the Senate on May 28, 1929, struck this amendment from the census bill. In this connection and at the suggestion of the chairman of the Joint Committee on Printing, who likewise opposed the census amendment, the Public Printer submitted the following statement:

The provision, if enacted into law, will nullify decisions of the Comptroller General and the Joint Committee on Printing holding that punch or tabulating cards constitute printing within the scope of the act of March 1, 1919 (40 Stat. 1270), and will grant a special and exclusive exception to the Director of the Census for the procurement of such cards from private contractors without regard to the laws regulating printing for all other branches of the Government service. The provision that punch cards shall not be considered printing would also prevent the Government Printing Office from furnishing such cards for future censuses and would give the Tabulating Machine Company a permanent and absolute monopoly in the printing of census cards.

If the Government Printing Office is unable to produce cards to the satisfaction of the Director of the Census, the Public Printer is authorized by the act of February 28, 1929 (Public, No. 844, 70th Cong., p. 16), to procure such printing done elsewhere under contracts made by him with the approval of the Joint Committee on Printing. That procedure has already been followed for other branches of the Government service. Recently, with the approval of the Joint Committee on Printing, the Public Printer contracted for the purchase of 75,000,000 cards for the General Accounting Office.

Therefore, it seems to me, the requirements of the Director of the Census for tabulating cards can be adequately and properly met under existing law and procedure without enactment of the provision proposed in the census bill, which would arbitrarily declare that census cards are not to be considered as printing, although similar cards in use by all other establishments of the Government are held to be printing. The provision could be of benefit only to the Tabulating Machine Company, which, by thus excluding the Government Printing Office, would have the protection of the law in a monopoly of the supply of census cards.

CONTRACT MORE THAN GOVERNMENT PRICES

Although the Government Printing Office had printed tabulating cards in vast quantities for every census since 1910, the Director of the Census insisted that cards for the census period beginning July 1, 1929, be furnished by contract with a tabulating machine company. So as not to be chargeable with any delay of census

work, the Public Printer agreed to contract for cards for the coming census, notwithstanding his belief that the Government Printing Office was able to print such cards. Competitive proposals were invited for supplying approximately 175,000,000 census tabulating cards. Only one bid was received, quoting a price which is approximately \$102,000 more than the estimated cost of printing such cards by the Government Printing Office.

In requesting the Joint Committee on Printing to approve the purchase of these cards from the Tabulating Machine Company, the Director of the Census stated "that further experimentation at this time would slow up tabulations of the Fifteenth Census."

The Bureau of the Census had also objected that cards printed by the Government Printing Office were too thin for satisfactory use in its machines, but soon after the contract was awarded to the Tabulating Machine Company, the Bureau of the Census waived its requirement for thicker cards, stating that the bureau can use the thinner cards "by slowing down the speed of the machines." Fortunately, the Public Printer can not be held responsible for any slowness of census tabulations on account of the thinner cards purchased of the Tabulating Machine Company.

PRINTING OF TABULATING CARDS RESUMED

Since February 28, 1929, when the Public Printer resumed the supply of tabulating cards by authority of Congress, the Government Printing Office has printed and delivered 17,507,000 cards for various Government departments and establishments in Washington, including the Departments of the Treasury, War, Navy, Interior, Agriculture, and Labor, the Interstate Commerce Commission, the Shipping Board, and the Veterans' Bureau.

As far as reported, these cards have been generally satisfactory except one lot for the Navy Department which is now being examined. Difficulties in obtaining acceptable paper stock appear to have been overcome, and the present supply is proving satisfactory.

In addition to the 175,000,000 tabulating cards to be ordered for the Bureau of the Census during the present fiscal year, the Public Printer has also contracted for 75,000,000 cards to be delivered to the General Accounting Office. For other Government services, 28,765,000 cards have been bought by the Public Printer, the total purchases to date being 278,750,000 cards. However, of this number, only 33,063,000 cards have been delivered, as compared with the production of 17,507,000 cards in the same time by the Government Printing Office.

DISCRIMINATION AGAINST GOVERNMENT CARDS

Another interesting phase of the tabulating-card situation is the fact that the two tabulating-machine companies still insist on exacting discriminatory rentals for the use of their machines with Government-made cards. One company adds 18½ per cent to the regular rental charge if its machines are used with Government-made cards, and the other company demands \$10 per month per machine as additional rental for the use of cards printed by the Government Printing Office.

The Public Printer has nothing whatever to do with the terms and conditions under which tabulating machines are leased by the various departments, but he believes that it is his duty to protest such unfair discrimination against the cards produced by the Government Printing Office.

For machines which the Public Printer proposed to install, the tabulating-machine companies have even gone so far as to demand discriminatory rentals if used with cards printed by this office.

Notwithstanding the decision of the Comptroller General, the two tabulating-machine companies in proposals to furnish cards have specified that they shall be used only in their own machines and have declined to bid on cards for use in machines of the other company.

CONGRESS THE LARGEST PRINTING CUSTOMER

Congress continues to be the largest customer of the Government Printing Office, with a total charge of \$2,487,436.88 against its 1929 printing and binding appropriation, an increase of \$26,820.80 over the cost of congressional work in 1928.

During 1929 there were printed 4,408,694 copies of congressional publications, including documents, committee reports, and hearings. The various prints of bills, resolutions, and amendments totaled 7,171,017 copies for the year. In addition, 4,154,804 copies of the daily Congressional Record were printed and 82,140 volumes of the permanent Record were printed and bound. All prints of the Congressional Record charged in 1929 cost \$580,289.31.

Other printing for Members of Congress includes the Agricultural Yearbook and farmers' bulletins, which are issued in vast quantities for free distribution by Senators and Members. In 1929 there were printed 400,776 copies of the Agricultural Yearbook at a cost of \$290,458.31. The expenditures for the Yearbook in 1929 decreased \$25,462.34, owing to the somewhat less number of pages which allowed more economical binding by machinery. Only 780 copies of the last Yearbook were sold to the public in 1929 at \$1.50 per volume.

Of farmers' bulletins, also largely for congressional distribution, 11,360,576 copies were printed in 1929 at a cost of \$145,143.87, a slight decrease from the expenditure of the preceding year.

COST OF PRINTING FOR COMMITTEES

Printing for committees of Congress in 1929 cost \$559,841.97, of which \$381,308.14 was expended for committees of the House and \$178,533.83 for committees of the Senate. Committee hearings alone cost \$406,552.65, as compared with \$275,328.76 expended for the printing of hearings in the preceding year. The hearings in 1929 consisted of 86,358 type pages. In all, 211,950 copies of committee hearings were printed. Hearings on the appropriation bills totaled 9,081 pages.

Tariff revision printing for Congress has been one of the biggest and hardest tasks undertaken by the Government Printing Office since the war. To date (January 10, 1930) the cost of printing in connection with pending tariff legislation amounts to approximately \$370,000. While the tariff bill was under consideration in the House of Representatives 31,900 pages of bills, hearings, reports, and information documents were printed. The Senate has added approximately 20,000 pages to the current literature on the tariff, bringing the congressional contribution to tariff information up to a total of nearly 55,000 pages.

The printing of hearings is generally an overnight job, delivery being required the following morning after the copy is received. This is especially the practice of the House Committee on Appropriations. Numerous appropriation hearings consisting of 400 to 600 or more printed pages have been completely set, read, corrected, and proofed between the hours of 7 p. m. and 8 a. m., and 10 sets of page proofs submitted to the committee the morning after the copy was received.

CONGRESSIONAL BILLS NEAR THE RECORD

During the Seventieth Congress 24,695 bills and resolutions were printed for the Senate and the House. This number was only a few less than the record-breaking total of bills and resolutions printed for the Sixty-ninth Congress. Nine omnibus pension bills enacted by the Seventieth Congress were a consolidation of 7,620 private bills and constituted the largest number of pension bills ever enacted by any Congress. One of the omnibus pension bills was the largest ever printed, making 563 pages. The House report accompanying this bill was also a record breaker with 962 pages.

The reprinting of speeches and other extracts from the Congressional Record for distribution by Members of Congress is not done at public expense by the Government Printing Office. The cost of this work is paid for by the individual Members, and the Public Printer is authorized by law to attach their salaries for any unpaid accounts. Fortunately, this method of collection has been necessary in only a few instances.

MEMBERS PAY FOR PRINTING SPEECHES

To inform the public more definitely as to the fact that the Government does not bear the expense of reprinting Members' speeches for personal distribution, such pamphlets now generally bear the statement, "Not printed at Government expense," which was authorized during the year by the Joint Committee on Printing.

Members of Congress paid \$66,490.67 out of personal funds for reprinting 16,296,050 copies of speeches and extracts from the Congressional Record during the fiscal year 1929. The preceding year these charges to Members of Congress amounted to \$68,266.19 for 17,191,250 copies of extracts from the Record.

Franked envelopes for the free mailing of congressional speeches and Government publications are furnished without charge to Senators and Members. The cost, including printing of the 22,280,925 franked envelopes so supplied in the fiscal year 1929, was \$54,950.96. The cost of 27,466,950 franked envelopes for congressional use in 1928 was \$66,813.17.

WORK DONE FOR THE POSTAL SERVICE

Next to Congress, the Post Office Department, including the Postal Service, is annually the largest customer of the Government Printing Office. The charges for printing for the Post Office Department in the fiscal year 1929 amounted to \$2,113,061.95, an increase of \$81,466.24 over the preceding year. In addition, the Postal Service has printing done at local post offices and contracts with commercial concerns for the printing of stamped and "penalty" envelopes.

The larger part of the work done for the Post Office Department consists of printing postal cards, which keeps three big presses running 8 hours, and sometimes 16 hours, daily throughout the year. Each press, with 80 plates, is capable of printing, cutting, and counting in packs of 25 or 50 at the rate of 6,400 cards per minute or 384,000 per hour.

The number of postal cards produced in the fiscal year 1929 was 1,820,181,228, for which the Post Office Department was charged \$981,908.75. In 1928 the number of postal cards was 93,656,836 less.

GAIN IN POSTAL CARDS AND MONEY ORDERS

Based on the 1-cent selling price of each card, the postal receipts from the total number printed in 1929 will amount to \$18,201,812.28, which is \$17,219,903.53 in excess of the amount paid to the Government Printing Office for the printed cards. Undoubtedly, this is one of the most profitable activities of the entire Government service. However, the figures do not include the cost to the Postal Service of handling in the mails this enormous number of postal cards.

Another year-round job for the Post Office Department is the printing of money-order forms and application blanks. During the fiscal year 1929 a total of 208,161,400 money-order forms were printed and bound into books of 200 each at a cost of \$168,933.42. The number increased slightly over the preceding year, which likewise showed a gain over the year before, thus indicating a steady advance in this important business.

In keeping with the number of money orders, there were also printed last year 204,915,000 application blanks for the use of money-order purchasers. The application blanks are now made up into pads by machinery instead of by hand as formerly, thus effecting a saving of \$6,000 annually. This economy is the result of an observation by the Public Printer of a similar process in the British Government Printing Office, through courtesy of the controller of His Majesty's Stationery Office.

The Post Office Department also uses annually many millions of other blanks printed by the Government Printing Office, including last year 187,827,000 notices of registered, insured, and C. O. D. mail, 20,000,000 registry dispatch cards, 33,395,000 return-receipt cards, and 15,000,000 change-of-address slips, which give some indication of the activities of the Postal Service during a single year.

PATENT OFFICE PRINTING RANKS HIGH

The Patent Office continues to rank third in the amount of printing ordered annually of the Government office; in fact, its 1929 expenditure of \$1,047,902.85 for printing patent specifications and the Patent Gazette was the largest sum spent by any one bureau or office. The charges were \$70,693.44 more than for 1928. This cost does not include the reproduction of drawings for current

issues of patents or the reprinting of exhausted copies, which are procured by the Patent Office under contracts awarded to commercial lithographers.

A total of 5,689,408 copies of specifications for patents, trade-marks, and designs were printed in the fiscal year 1929, an increase of 334,324 copies over the preceding year. The type pages for the 1929 specifications totaled 153,316, as compared with 142,073 pages of the 1928 specifications, an increase of 11,243. During the year 3,205 more patents, trade-marks, and designs were printed than in 1928.

There were 316,938 copies of the weekly Patent Gazette printed in the fiscal year 1929, which was 37,802 more than in 1928. Printing and binding the Gazette in 1929 cost \$229,222.21.

SECTION FOR PATENT WORK ENLARGED

To keep pace with the constant increase of printing for the Patent Office, the special section devoted to that work in the Government Printing Office was enlarged during the year by the addition of 20 more typesetting machines, bringing the number assigned exclusively to patent work up to 64 machines. The product of these machines keeps six presses running much of the time. The installation of two new perfecting presses has reduced by one-half the presswork time on the Patent Gazette.

A number of new economies in the printing of patent specifications were made effective during the year, which will facilitate the work of this office in the handling of approximately 1,000 patent specifications every week throughout the year.

The patents section was rearranged recently and is now one of the best planned and most convenient workrooms in the office. It is quite capable of handling the increase of work that is coming from the Patent Office, which was flooded with 114,688 applications last year. Of that number, 92,221 related to patents, but the Patent Office was able to approve only 47,147 specifications for printing during the year.

PATENT COPY PREPARATION COSTLY

Copy for patent specifications presents the most difficult task in Government printing owing to its lack of proper preparation by the Patent Office for the usual methods of typesetting and proof reading. Only part of the vast number of amendments are inserted at the proper places in the voluminous specifications as submitted to this office for printing. Therefore, the copy editors, linotype operators, proof readers, and revisers in the Government Printing Office are required to search through the mass of papers accompanying each

patent to find amendments for insertion at their proper places in the text of the specifications.

Often several amendments are written on the same sheet of paper, which, under Patent Office rules, can not be cut or marked. So it is necessary for the editors in the Government Printing Office either to copy the amendments or to indicate their proper location for both the linotype operator and the proof reader.

If the copy could be cut by the editor or the amendments inserted in their proper place by the Patent Office, the printing of specifications would be greatly expedited and done at much less cost than under the present slow and cumbersome method prescribed by the Patent Office. As it is, copy editors, proof readers, and linotype operators, who are paid \$1.10 per hour by the Government Printing Office, do a large amount of work that could and should be handled by minor clerks in the Patent Office.

DISCUSSION WITH THE PATENT OFFICE

This awkward and costly procedure has been discussed with the Patent Office for several years and some improvement has recently been made in the preparation of its copy. But in the 47,147 patent specifications edited by the Government Printing Office during the fiscal year 1929 there were 18,577 separate amendments, making 30,264 lines, which should have been written into the text of the specifications by the Patent Office instead of submitted on separate sheets. The failure to do so made it necessary for the Government Printing Office to complete this work.

It is really remarkable under such adverse conditions that specifications are printed with so few mistakes as have been reported to this office. Only 16 patents out of the 47,147 printed during the fiscal year 1929 were returned for reprinting on account of typographical errors.

The Public Printer has suggested to the Patent Office that the present cumbersome form in which specifications are submitted for printing could easily be improved by supplying amendments in duplicate so that one copy might be cut for proper insertion in the respective specifications. But, as yet, the Commissioner of Patents has declined to agree to this proposal, which he says would provoke objection by patent attorneys. If the suggested improvement in preparing patent specifications could be made effective, the Public Printer would gladly assure the Patent Office a material reduction in the charges for its printing.

The only progress made thus far in the better preparation of patent specifications copy has been to induce the Patent Office to insert some amendments of a few words and to request attorneys not to

split the text of an amendment between two pages. This improvement has materially reduced the time lost by operators in trying to locate "run-over" amendments which were a serious handicap in the effort to print the specifications within the prescribed time limit and at a reasonable cost.

WORK FOR THE EXECUTIVE DEPARTMENTS

The Department of Commerce, exclusive of the Patent Office, obtained printing and binding for its other activities in the fiscal year 1929 at a cost of \$796,857.81, an increase of \$4,392.60 over the preceding year.

Including the Patent Office, the total amount of printing charged to the Department of Commerce for the fiscal year 1929 was \$1,844,760.66. With a larger amount of work in prospect for the decennial census of 1930, it is quite likely that the cost of printing for the Department of Commerce may lead the customers of the Government Printing Office next year.

Publications printed for the Department of Commerce in the fiscal year 1929 totaled 5,992,372 copies, 1,050,516 copies more than in the preceding year.

The Treasury Department, another large printing customer, spent \$929,992.81, which was \$37,810.96 less than for the preceding year. Treasury publications in 1929 totaled 3,509,507 copies, a decrease of 1,610,693 from the number of copies printed in 1928. Income-tax returns for 1929 required the printing of 62,650,000 blanks, an increase of 12,315,000 over the preceding year.

The Department of Agriculture likewise showed a decrease in its printing during the fiscal year 1929, with an expenditure of \$803,828.88, which was \$81,057.35, or 9 per cent, less than in 1928. Agricultural publications during the year decreased 24 per cent, or 7,673,810 less copies than were printed in 1928, the number of copies for 1929 being 31,823,869.

WAR AND NAVY PRINTING INCREASES

On the other hand, the War Department showed a material gain in its publications, increasing the number of copies by 30 per cent. The total for the fiscal year 1929 was 13,853,211 copies, mostly orders and regulations for the Army. War Department printing cost \$677,336.14 in 1929, an increase of \$22,826.59 over 1928.

The Navy Department kept pace with the War Department in printing, which cost \$675,065.11 for 1929, an increase of \$60,677.07 over 1928. Navy publications for the year gained 7 per cent, with a total of 2,143,557 copies, or 136,717 more than in 1928.

Other departments and establishments issuing more publications in the fiscal year 1929 than in 1928 were the Department of Labor, with an increase of 229,474 copies; the Interstate Commerce Commission, with an increase of 301,413 copies; and the Interior Department, with an increase of 29,317 copies; the total number of copies printed for each in 1929 being as follows: Labor, 1,903,496; Interstate Commerce Commission, 2,151,107; and Interior, 1,984,039.

OFFICE BUYS ITS OWN PRODUCTS

That the Government Printing Office is also a good purchaser of its own products is shown by the fact that the Superintendent of Documents paid the Public Printer the sum of \$642,784.55 to print publications for sale and depository library distribution during the fiscal year 1929. The increase over 1928 was \$23,756.84.

The Library of Congress is also an important patron, its expenditures with this office for the fiscal year 1929 amounting to \$334,502.33. Printing and binding for the Library in 1928 cost \$343,853.76.

Work for the Library of Congress is done largely in the printing and bindery branches which the Government Printing Office maintains in the Library building. The printing branch has 6 linotype machines, 5 presses, and an annual average of 21 employees. They are engaged largely in printing library catalogue cards which totaled 20,429,200 for the fiscal year 1929, an increase of 1,820,090 over the preceding year. Of this number 3,904,000 were reprinted by the offset process in the main office.

The Library bindery branch is completely equipped for library repair work and has an annual average of 58 employees on its rolls. Their workmanship in the repair and restoration of rare books and manuscripts for library preservation is of the highest class and has been greatly commended by the Librarian of Congress.

JUSTICE LEADS IN "RUSH" ORDERS

The Department of Justice has taken the lead in recent years in demanding that the Government Printing Office "rush" nearly all the printing for that department. The extra charge to the Department of Justice for "rush" work in 1929 was \$6,984.57. The total expenditure by all departments and establishments of the Government for that purpose in 1929 was \$26,253.98 or \$2,123.59 more than in 1928.

The total extra charges for "rush" work for the nine years, 1921-1929, was \$249,290.47, of which the Treasury Department paid \$84,329.79, mostly in the first three years, and the Department of Justice \$30,709.30, mostly in the last four years.

The extra charge for "rush" work is 50 per cent, which is necessary on account of the additional labor required to expedite such orders by displacing other jobs in the regular course of production. That is especially difficult, as practically all printing for Congress, particularly bills, reports, hearings, and the Congressional Record, must be treated as "rush" work and produced overnight for delivery the following morning. Any interruption with this program imposes an extra burden and an additional expense on the office.

SAVING IN REDUCTION OF ANNUAL REPORTS

The action of Congress in adopting a recommendation of the Senate Committee on Appropriations authorizing heads of departments and establishments to reduce and discontinue the unnecessary printing of many annual reports since 1920 has saved approximately \$1,500,000 in the last nine years. Since 1920, the original copies of reports not printed are kept on file in the respective offices for public inspection as provided by law.

The annual reports for the fiscal year 1928, printed in 1929, cost \$210,631.10, as compared with \$360,436.65 for the reports of 1920, the last year for which all reports were printed. The printed reports for 1928 contained 25,111 type pages compared with 58,940 pages in the reports for 1920. Of the 1928 reports, 436,997 copies were printed, and of the 1920 reports, 481,708 copies.

To print the Annual Reports of the Public Printer for the nine fiscal years, 1921-1929, the cost was \$7,730.56, and for the nine fiscal years, 1912-1920, \$45,520.11, showing a saving to this office alone of \$37,789.55 by the reduced size of its annual reports.

CONGRESS CAUSES CONGESTION OF WORK

Owing to the extra session of Congress and the vast quantity of printing required for the revision of the tariff, the Government Printing Office was flooded with work during the early months of the fiscal year beginning July 1, 1929, and the great demand for printing has continued to date. The congestion was increased by the additional printing which always comes from a change in the principal administrative officers of the Government. In addition, the office took on a large amount of new work for the District of Columbia, including its schools, and also began the production of blank books and standard forms in large quantities.

Soon after the beginning of the present fiscal year, July 1, 1929, there was a brief slowing up of work by the inauguration of a new leave policy requiring employees to take half of their annual leave during the summer months, when Congress usually is not in session. It was thought that with only the Senate in session considering the

tariff bill at that time there would be less congressional printing and that a smaller force could keep up with current requirements, but it was found difficult to do so. However, now that the principal leave period has been passed, there will be a steadier force at work for the remainder of the fiscal year, which will insure greatly increased production.

DRIVE TO COMPLETE 60-DAY-OLD JOBS

To meet this abnormal situation the Public Printer ordered a special drive early in October to finish all work that had been in the office more than 60 days. On October 14 there were 2,133 jackets (work registers) of such old jobs on hand. By January 6, 1930, the number was reduced to 488, a decrease of 1,645, which is considered a splendid accomplishment.

Of the 488 old jobs listed on January 6, there were 88 out on proof to the departments, leaving only 400 pending in this office. The printing division on that date had only 135 old jobs, of which 85 were out on proof. On October 14 the printing division had 653 old jobs, of which 395 were out on proof.

On October 4 there was a total of 7,995 jobs pending in the Government Printing Office. As a result of the vigorous effort to expedite both the old and current work, the number of jobs on hand was reduced by January 6 to 5,836, a decrease of 2,159, and 966 less than were on hand at the corresponding time last year.

Many of the long-pending jobs were delayed on account of slowness in the return of proofs by various departments and establishments. In order to expedite this work and relieve the office of the large accumulation of type awaiting proofs, the Public Printer decided that it would be necessary to request the return of proofs within 30 days. The departments were notified that, beginning November 30, 1929, printing requisitions would be canceled on failure to submit proofs within the specified time.

NOTICE TO RETURN OUTSTANDING PROOFS

The following notice was issued by the Public Printer under date of November 1, when the proofs on approximately 200 jobs had been held by authors for more than 30 days:

Your attention is respectfully invited to the attached list of proofs which were sent out more than 30 days ago, but have not as yet been returned to this office. The long delay in returning proofs seriously interferes with our work and prevents the rendering of more expeditious service, which would be possible if proofs were not withheld for such long periods.

The holding of proofs by various departments and establishments of the Government has so filled this office with uncompleted work that it has become difficult to handle more urgent jobs with the promptness required.

Therefore, it has been deemed necessary to adopt a rule canceling requisitions for printing delayed by failure to return within 30 days the proofs submitted by this office. The cost of the uncompleted work will be charged against the canceled requisition. Another requisition will be required if it is desired to continue the work, which will then be taken up in due course according to the date of the new order.

The new rule will become effective on and after November 30, 1929. In the meantime, it is hoped that the outstanding proofs will be returned promptly so that there will be no need to cancel requisitions for any work now in progress or hereafter ordered.

In compliance with the foregoing notice many old proofs were returned, and on December 1 it was necessary to cancel only 62 requisitions on account of withheld proofs. In January 22 other requisitions were similarly canceled. These orders may be renewed later, but in fairness to those who return their proofs within a reasonable time the revived orders will be classed as new work.

It is quite evident that there would be little or no need for departments to retain proofs any considerable length of time, as has been the frequent practice, if the manuscripts were correctly written and edited before they are sent to the printer to be put in type.

HOLDING TYPE HANDICAPS THE OFFICE

Another source of trouble is the increasing amount of old type which the Public Printer has been requested to retain in page form for possible reprinting at some later time. An inventory completed on December 4, 1929, showed approximately 60,000 pages of type held in storage for the various departments and establishments. The Department of Commerce occupied the largest space with 13,809 pages of type held for reprints. The Navy Department had 5,843 pages of type in storage, and the War Department 5,162 pages. These pages of type required careful handling and safeguarding and occupied space needed for current work which is already overcrowding the office.

The storage situation became so serious last September, with requests to hold 8,250 additional pages of type, that the Public Printer decided to charge storage for type held on order. It was decided to begin the new charge at a nominal rate of 15 cents per octavo page for storage of six months or less.

CHARGE IS MADE FOR STORAGE OF TYPE

Accordingly, the following regulations governing the storage of type in the Government Printing Office have been issued for the information of the departments and other establishments of the Government:

On and after January 1, 1930, a charge for storage of type ordered to be held by departments and independent establishments will be made in accordance with accompanying schedule. In the event request to retain is not received by February 1, 1930, type now in storage will be melted. If requested to retain, storage charge will be made as of January 1, 1930.

SCHEDULE OF CHARGES

Octavo page or smaller: Fifteen cents per page for 6 months or less, 25 cents per page for more than 6 months but not over 1 year.

Larger than octavo page: Twenty cents per page for 6 months or less, 30 cents per page for more than 6 months but not over 1 year.

Type will not be retained beyond period charged unless an additional requisition is submitted for the purpose. No type will be held longer than one year unless by special arrangement with the Public Printer.

No type will be kept standing except as indicated and charged on original requisition.

Charge for holding type will not apply to publications originating in Congress, or type held for convenience of the Government Printing Office, but storage will be charged for all other type if held for subsequent reprint, consolidation, or "pick-up" in any form.

Request to hold type will not affect the right of the Public Printer, under law (sec. 25, act of 1895), to plate when needed.

No charge for storage of plates for reasonable period will be made.

FAST STORAGE OF TYPE PAGES AND PLATES

In addition to the storage of approximately 60,000 pages of type held for future reprinting, there are constantly many thousands of additional pages and galleys of "live" type on hand, going through the different processes of printing or awaiting the return of proofs from the departments. The total number of active and stored pages of type is approximately 200,000.

In the vaults of the office also are stored more than 1,500,000 electrotypes and stereotype plates, held for reprint orders. It is necessary from time to time to request permission to melt useless plates so as to regain the metal for further service and to secure space for new plates. During the year 242,000 plates were melted, and approximately 550,000 pounds of metal returned to active use.

AUTHORS' ALTERATIONS AGAIN EXPENSIVE

Authors' alterations not due to typographical errors added \$215,734.48 to the cost of printing in the fiscal year 1929, an increase of \$22,915.54 over the expenditure caused by authors in the preceding year. Congress headed the list of authors' alterations with a charge of \$51,918.75, and took first place from the Department of Commerce. An author's alterations on the proofs of one congressional publication printed during the year cost \$16,786.66, which was more than the entire charge for setting the original copy in type.

The Department of Commerce expended \$22,220.51 in 1929 for type changes required by its writers after their manuscripts had been put into printed form. Other departments were more reluctant to alter their proofs, the War Department ranking next to Commerce with an expenditure of \$16,888.66 on that account.

In the nine fiscal years, 1921-1929, during which the Government Printing Office has kept a special account of the charges for authors' alterations, the total cost has been \$1,825,786.09. The largest charge was to the Department of Commerce, amounting to \$234,156.57.

MUCH EDITING DONE ON PRINTED PROOFS

As shown by the enormous cost of authors' alterations, much re-writing and editing is done after the original manuscripts have been printed in proof form. Such procedure is not only very costly and grossly wasteful but also delays the publication affected by the mystifying and time-consuming alterations. Often it takes longer to make the changes noted on the proofs than was required to set up the job in the first place. In many instances it has taken less time and been more economical to reset the entire text as altered rather than correct it as marked on the proofs.

Undoubtedly, a considerable part of the expense of authors' alterations could be avoided by the correct writing and editing of copy before it is sent to the printer.

Therefore it is again urged that departmental authors prepare their manuscripts properly and completely before printing and that they discontinue the costly practice of rewriting their manuscripts on the printed proofs.

In this connection attention is invited to the following timely statement in the annual report of the Permanent Conference on Printing and the Bureau of the Budget under date of June 30, 1929:

The practice of many authors of making corrections after page proof has been submitted by the printer has again been brought to the attention of the conference. While investigation shows that this evil is being corrected gradually, there is still room for improvement, and those who submit manuscripts for printing are again asked to so prepare their copy that extensive changes will not be necessary after the material has been put in type.

COMMITTEE PREPARING NEW STYLE MANUAL

With the hope of securing more uniform preparation of copy as well as better style of printing, the Public Printer has undertaken a thorough revision of the Style Manual of the Government Printing Office. To aid in this work and to benefit from their able advice, several other branches of the Government service were invited to designate representatives to join with the style board of the Government Printing Office in the preparation of a new Manual of Style

for Government printing. Acceptances by the Secretary of State, the Secretary of the Interior, the Secretary of Agriculture, the Secretary of Commerce, the Librarian of Congress, and the Secretary of the Smithsonian Institution are greatly appreciated by the Public Printer.

The joint advisory committee so selected is now engaged in a complete revision of the present manual for consideration by the Public Printer in determining the forms and style of Government printing and binding. It will require several months to complete the work, but it is believed that the time so spent will be of great value to the entire Government service as well as to this office.

STYLE DETERMINED BY THE PUBLIC PRINTER

Style manuals have been published by the Government Printing Office from time to time for many years under authority of section 51 of the printing act of 1895, which provides that—

The forms and style in which the printing or binding ordered by any of the departments shall be executed, and the material and the size of type to be used, shall be determined by the Public Printer, having proper regard to economy, workmanship, and the purposes for which the work is needed.

Although originally intended for official use in the Government Printing Office as a guide to composition and proof reading, the manuals have been of service to other branches of the Government in preparing copy for printing and in establishing rules for spelling, capitalization, syllabication, punctuation, abbreviations, etc.

Under date of February 15, 1922, the Permanent Conference on Printing approved and adopted the Government Printing Office Style Manual as the style to be followed thereafter in all Government departments and independent bureaus. At the same time the Joint Committee on Printing also expressed its approval of the Style Manual.

A limited revision and reprint of the manual was issued in 1928 to meet the needs of the Government Printing Office, but as many important changes and improvements have been proposed, it has been deemed advisable to undertake a more complete revision of the manual with the aid and advice of the committee now at work.

EFFORT MADE TO SIMPLIFY TYPE FACES

In an effort to simplify type faces used for Government printing the Public Printer recently caused a thorough inventory to be made of all the type on hand, including linotype, monotype, ludlow, and foundry type faces. This survey has revealed that the office had in stock approximately 650 fonts of display type faces which were sufficiently obsolete or of such little use as to justify discontinuance.

The elimination of these fonts has resulted in abolishing 75 obsolete type faces and will facilitate the adoption of more suitable type for better typography in both book and job composition. It is planned also to procure several additional faces, which the Government Printing Office needs for the better class of printing to keep pace with progress in the art.

Of the 650 fonts discarded, 435 were foundry type for hand composition, of which this office now does very little owing to the large installation of typesetting machines. The obsolete faces of foundry type range from 6 to 72 points in size. In addition, 181 fonts of monotype from 6 to 36 points and 34 fonts of linotype of miscellaneous character were discarded.

Fully a ton of obsolete foundry types was taken out of the branch office in the Library of Congress, reducing its stock of type faces from 35 to 15, which are deemed more appropriate for library printing.

TYPE FONTS REDUCED FROM 1,113 TO 650

Due to the gradual accumulation of types bought from time to time since the establishment of the Government Printing Office in 1861, the office had acquired a total of 107 faces representing various periods of antiquity. These faces ranged from 6 to 72 points in size, totaling 1,113 fonts of type. The discarding of 650 fonts has greatly reduced the stock, but there is plenty of type left for a further simplification at another time.

With the 32 faces still on hand in complete series, the office has a sufficient variety of types to meet all reasonable requirements for Government printing. However, printing is not a mere manufacturing process, and types ought not to be standardized like paving bricks. A sufficient variety of good faces should always be available for proper expression of "the art preservative of all the arts."

SOME LETTERS OF COMMENDATION

Letters commending the work of the Government Printing Office are always called to the attention of those responsible for the good service so that they may know their efforts have been appreciated by others as well as by the Public Printer. It seems fitting, therefore, to include a few of these courteous communications in this report that the public also may know something of the good work that has been done by the Government Printing Office. Accordingly it affords the Public Printer great pleasure to quote as follows from some of the letters of appreciation received during the last year:

From Director of the Bureau of the Budget, Col. J. Clawson Roop:

I wish to extend my thanks to you and your corps of able assistants in connection with the printing of the Budget for 1931. Captain Moorhead and Messrs. Barnhart, Mitchell, and Phillips have cooperated with us to the fullest extent in producing this important work in so limited a time.

The annual book of the Budget as transmitted to Congress has come in recent years to be one of the biggest publications of the Government, and its printing is by far the most important job this office has to do each year on schedule time. This book of 1,500 pages of tabular matter, quarto size, has to be set up and bound anew every year in less than six weeks' time so as to be available for the opening of Congress each December.

From the Comptroller General of the United States, Hon J. R. McCarl:

I wish to express my appreciation of the helpful service which you have rendered and are rendering in the printing of Government accounting forms, especially the printing and distribution of the standard forms.

From the Secretary of War, Hon. Dwight F. Davis:

The advance copies of the Army Register for 1929 have been received. Despite the fact that the new feature in this year's publication, i. e., the emergency officers' retired list, delayed work in this office, your effective co-operation and helpful assistance resulted in the very early production of this document.

I trust you will accept my most cordial thanks for your assistance, and I wish you would also say to the employees of your office how much the War Department appreciates their cooperation.

From Hon. Elmer Thomas, United States Senator from Oklahoma:

I wish to compliment you and your efficient force for the few errors permitted to creep into the Congressional Record, because it is very seldom that any corrections are necessary.

From the Secretary of the United States Senate, Col. Edwin P. Thayer:

On April 23, 1929, 69 requisitions were written for envelopes, letterheads, and copy paper; stationery for Senators that have changed committees and new Senators being placed on committees. Letterheads totaled 113,000, envelopes 78,000, and copy paper 57,000. All of this stationery was delivered on April 26. Your office is to be commended on making delivery of such a large amount of stationery in three days' time. I am sure the Senators will appreciate this courtesy.

From the Assistant Secretary of the Treasury, Hon. Henry Herick Bond:

I wish to express my personal appreciation of your kindness in arranging for the expeditious handling of our Internal Revenue Regulations No. 74. I

realize that your office is working under unusual pressure due to the impending adjournment of Congress, and I appreciate the fact that it was not an easy matter to give this large job special consideration.

From the Assistant Secretary of Commerce for Aeronautics, Hon. William P. MacCracken, jr.:

As chairman of the executive committee of the recent International Civil Aeronautics Conference, I want to extend the thanks of the committee and my own thanks to you for the services rendered to the Conference by the Government Printing Office.

The task of preparing the book of papers submitted to the conference was indeed a difficult one as were the numerous emergency printing orders which had to be executed from time to time. I have heard nothing but praise for the work of the Government Printing Office in connection with the conference and I wish to thank you not only for the important contribution which you made toward its success but also for the generous spirit of cooperation which you and your organization demonstrated at all times.

From the Executive Officer of the International Civil Aeronautic Conference, Maj. Leighton W. Rogers:

We had considerable work done for us at the Government Printing Office and I take pleasure in saying that it was all done on time, more carefully than it seemed to me possible to hope for, and with a minimum of effort.

From the Paymaster General of the Navy, Rear Admiral J. J. Cheatham:

The Bureau of Supplies and Accounts desires to express to you its deep appreciation of the very courteous and helpful cooperation of the Government Printing Office in the printing of the new Bureau of Supplies and Accounts Manual (Requisition No. 2545, Jacket No. 48679).

The bureau is very much pleased with the way in which this printing job was handled and the careful compliance with our special requests regarding the style and composition of the manual.

From the Director General of the Pan American Union, Dr. L. S. Rowe:

I have your letter of June 8 and wish to assure you how deeply I appreciate your prompt and cordial response to my request. You have always been so helpful to the Pan American Union that I always feel any request made of you will be granted provided it is within your power to do so.

From the Presiding Judge of the United States Court of Customs and Patent Appeals, Hon. W. J. Graham:

I desire to compliment your office on the expeditious manner in which it has printed and bound the sixteenth volume of the reports of this court. This volume was closed on the 1st of April last, and was received by me about September 15th. This, so far as I know, is a record. Usually we are obliged to wait about a year before we can get the last volume of our reports. This year we have the last year's decisions fully bound and indexed, and on hand to help us in our work during the coming year, which is a great advantage. I am very pleased, and thought I ought to tell you so.

From the Assistant Secretary of the United States National Museum, Mr. A. Wetmore:

Permit me to say that I greatly appreciate the expedition with which the Government Printing Office has handled the matter of preparation of a distribution map of eastern Africa. Sudden need arose for the map in question due to the impending departure of one of our workers for Africa for a year's absence. With the map in hand he can finish his reports before leaving, a matter of considerable importance.

I hope that you will express to those concerned in the Government Printing Office my appreciation of their cooperation in this matter.

From the Director of the Bureau of Investigation, Department of Justice, Mr. J. Edgar Hoover:

I want to take this opportunity to express to you my sincere appreciation of the recent splendid work of the Government Printing Office in printing a Manual of Rules and Regulations for the Bureau of Investigation of the Department of Justice.

Mr. Jeffries, Mr. Barnhart, Mr. Summers, and Mr. Mitchell, of your office, were particularly cooperative and courteous to officials of the Bureau of Investigation in all matters connected with this printing.

The new manual is free from errors and is an excellent piece of work.

From the Chairman, United States Delegation to the World's Dairy Congress, Hon. Renick W. Dunlap:

In the inclosed page proof of the report of the Eighth International Dairy Congress, * * * I want you to know that the man who checked this material for me spoke very highly of the proof reading which has been done on this report.

From the Director of Information, Department of Agriculture, Mr. M. S. Eisenhower:

When the Mediterranean fruit fly was discovered in Florida recently the Department of Agriculture's supply of bulletins pertaining to this dangerous pest was exhausted. This, as you undoubtedly know, is the first infestation of the fruit fly in the United States. Because of the fact that the pest attacks over 70 fruits and vegetables, it was of utmost importance that the educational phase of the campaign of eradication be carried forward promptly.

The splendid cooperation which you and your associates in the Government Printing Office extended in immediately reprinting Department Bulletin 640, which is being used effectively in this emergency, is very sincerely appreciated by the Bureau of Entomology and officials of other bureaus in this department.

Another letter from the Director of Information, Department of Agriculture:

Will you please express to all the members of your staff who contributed to the result the appreciation of the Department of Agriculture for the quick and satisfactory delivery of Miscellaneous Publication 44, The Agricultural Outlook, 1929, which was so urgently needed for distribution during the first week in February? It is indeed gratifying to know that your organization responds with such prompt and efficient cooperation, especially at a time when your office is running at top speed incident to the closing days of a short session of Congress.

I personally want to thank you and your people in the printing section, press-room, binding, and distribution sections for the splendid work in speeding up the delivery of this important publication.

From the Chief of the Bureau of Chemistry and Soils, Department of Agriculture, Mr. Henry G. Knight:

I want particularly to express our appreciation of the whole-hearted cooperation shown by you and the binding division of your office in binding these books for us. Every man in the bindery with whom we had occasion to come in contact was very courteous and cordial and showed a genuine spirit of interest and willingness, which was very helpful in this work and which we deeply appreciate.

From the supervising special agent, Bureau of the Census, Mr. H. H. Pierce:

I am very grateful to you for your very comprehensive statement of March 26, in answer to my informal memorandum of March 8, asking the assistance of the printing office in the selection of suitable papers for the population and agriculture schedules for the Fifteenth Census.

Your information and recommendations have made easy the determination of what seemed to be a perplexing problem. The officials of the Census Bureau are appreciative of the helpfulness of the officials of the Government Printing Office in all matters affecting the interests of the Fifteenth Census, and will be pleased, when opportunity offers, to formally acknowledge the obligation.

From the chairman of the Inaugural Committee, Lieut. Col. U. S. Grant, 3d:

At the request of the Inaugural Committee, you recently published a reprint of a pamphlet entitled "Points of Historic Interest in the National Capital." The republication of the pamphlet for the inaugural was, in my opinion, of great benefit, and I appreciate the work done by your office in getting it out during the period when there was much other work on your hands.

From the clerk of the Joint Committee on Printing, Mr. Ansel Wold:

Permit me to express my sincere appreciation for the magnificent work accomplished by the employees of the Government Printing Office in producing the Biographical Directory of the American Congress for 1927.

From the standpoint of typography it certainly is a work of art, for which your office is entitled to great credit, and I desire to express through you my sincere thanks to those who participated in the publication of this volume for their untiring efforts, genuine interest, and uniform courtesy so generously manifested during the long and arduous task.

The efficient service and hearty cooperation of yourself and the employees in your organization who assisted on this job have been a large factor in bringing this publication to a final conclusion and it is hereby most gratefully acknowledged.

From the secretary of the Boy Scouts of America, Mr. E. S. Martin:

I want to express my appreciation for the very helpful way in which the Government Printing Office made possible our annual report for the annual meeting here in New York.

Will you please express to Mr. Mitchell and to the other men who helped in putting this job through my sincere personal appreciation of their helpfulness.

SALE OF GOVERNMENT PUBLICATIONS

The sale of Government publications has come to be one of the most important and profitable activities of the Government Printing Office. In the last 10 years the receipts amounted to \$4,723,316.46, of which, after reimbursing the Public Printer for the cost of printing and binding, there was deposited in the Treasury a surplus of \$1,391,622.84 for other appropriation by Congress. Receipts in the fiscal year 1929 amounted to \$705,802.41, an increase of \$505,062.42 over the sales for 1919.

Undoubtedly, the sale of Government publications could be increased still further if Congress would authorize the Public Printer to establish sales agents for more convenient service to the public. Under the present law the sales price of Government publications is fixed at reprint cost plus 10 per cent, and resale by others for a profit is forbidden. This restriction prevents book dealers from receiving any compensation for handling Government publications; in fact, they generally sustain a loss, for the Government exacts the same price of the book dealer as he is permitted to charge his customer, without any allowance for expense of handling. If the book dealer has to remail a Government publication he must pay the postage, although the Superintendent of Documents can mail direct to the customer free of postage.

Such discrimination and lack of remuneration have greatly handicapped the sale of Government publications by book dealers and others, who undoubtedly would be willing for a fair profit to assist in serving the public at convenient and customary places of sale.

BOOK AGENCY PLAN IS PROPOSED

It is proposed, therefore, that the Public Printer be authorized to fix the prices and terms for the sale of Government publications at not less than cost, permitting the allowance of a discount to regular dealers who could then afford to sell at the price fixed by the Government. The public would thus have the advantage of service from their regular book dealers or the Government Printing Office at a uniform charge. Other Governments have a similar plan of selling through book dealers, and it has proven of great benefit to all concerned.

As an additional aid in the sale of Government publications, the suggestion is submitted that other officers of the Government be permitted also to act as agents of the Superintendent of Documents, so the public may have more convenient places for the purchase of Government books and pamphlets.

All these facilities would be certain to increase the sale of publications and render good service to the public as well as profit to the Government.

To make the foregoing proposal effective, the following tentative draft of appropriate legislation is submitted for the consideration of Congress:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Public Printer is hereby authorized to print and bind additional copies of any Government publication, not deemed confidential, which the Superintendent of Documents shall requisition for sale at not less than cost as determined by the Public Printer, who shall also fix the prices and terms therefor; and the receipts from such sales in excess of the cost shall be deposited in the Treasury of the United States to the credit of miscellaneous receipts: *Provided*, That the Superintendent of Documents may designate any Government officer his agent for the sale of Government publications as shall be agreed upon by the Public Printer and the head of the respective department or establishment of the Government.

SEC. 2. All acts and parts of acts otherwise regulating the sale of Government publications by the Superintendent of Documents are hereby repealed.

LARGE SALES STOCK IS AVAILABLE

Available for sale by the Superintendent of Documents is a stock of 6,000,000 copies of more than 65,000 different publications that date back to the establishment of the Government Printing Office nearly 70 years ago. The sales during the fiscal year 1929 consisted of 490,314 cash orders, an increase of 20,385 over the preceding year and 327,414 more than in 1919.

Although the public has been warned repeatedly that postage stamps are not acceptable in payment for publications, inasmuch as the Government with its free mailing privilege has no use of its own for stamps, the remittances last year included \$13,759.79 in postage stamps. The Post Office Department declines to redeem stamps, but fortunately most of them have been used in mailing foreign orders and thus were not returned to the senders.

The sale of Government publications by dealers would also curtail the troublesome handling of stamps as well as the individual remittances of money orders and personal checks, which totaled 228,446 in the fiscal year 1929.

The handling of such a large number of stamps, checks, and money orders causes a vast amount of accounting work, which has been doubly complicated and safeguarded by recent regulations of the Comptroller General.

FREE DISTRIBUTION IS ENORMOUS

Another continuous operation of the Public Documents Division under the direction of the Superintendent of Documents is the stocking and mailing of vast numbers of copies of Government publications for free distribution by the various departments and establish-

ments of the Government. During the fiscal year 1929 this free distribution amounted to 44,398,483 copies of various departmental publications.

The regular mailing lists maintained by this office for the departments number 636 and include 697,857 names of persons who were designated to receive copies of specified publications, mostly free of charge. In addition, thousands of individual mailings were made by this office, besides 7,156,000 copies of farmers' bulletins sent out on orders by Members of Congress.

The vast free distribution for the departments does not include approximately 600,000 copies of publications delivered during the year to the folding rooms of the Senate and the House of Representatives for gratuitous distribution by Members of Congress.

PREPARATION OF DOCUMENTS CATALOGUES

Progress has been made in the effort to bring up to date the preparation and printing of the big catalogues of all Government publications issued during each Congress. The Documents Catalogue for the Sixty-sixth Congress, covering the period 1919-1921, was available on November 1, 1929. It is almost as large as that published for the Sixty-fifth Congress, which includes the record-breaking number of publications for the World War. The catalogue for the Sixty-sixth Congress contains 2,422 pages of entries, being only 285 pages less than the catalogue for the period of the Sixty-fifth Congress, 1917-1919.

Work is well along on the Documents Catalogue for the Sixty-seventh Congress and has been started on that for the Sixty-eighth Congress. It is hoped to complete both of these catalogues by July 1, 1930, and then finish two catalogues a year until this long-delayed task has been brought up to date.

The overwhelming amount of work required for the Documents Catalogue of the war period and the impossibility, until recently, of obtaining an adequate force of cataloguers, caused this great undertaking to get almost hopelessly behind the time in which it otherwise would have been completed.

The mimeographing and multigraphing of many Government publications has also added greatly to the work of the indexers and cataloguers on the rolls of the Superintendent of Documents. Prior to April 25, 1927, very few copies of such publications were received by this office, but since then immense quantities have been submitted regularly.

Beginning with the Seventieth Congress, it is planned to have all mimeographed and multigraphed publications of a permanent character listed in the Documents Catalogue issued biannually.

DESIGNATION OF DEPOSITORY LIBRARIES

Distribution of Government publications to depository libraries continues to be a serious problem for the Superintendent of Documents, who has that work in charge. The number of different publications sent to depository libraries in the fiscal year 1929 was 4,092, and the total number of copies forwarded to all depository libraries in that year was 1,196,148.

There are now 492 depository libraries to which copies of Government publications must be sent according to law. The total possible designation of depository libraries by law and by order of Members of Congress is 663, showing that the privilege is still available to 171 other libraries, if they can qualify for selection.

A library can not be removed from the list of depositories after once selected, except when it ceases to exist or voluntarily requests to be dropped. Although originally there was only one depository library for each congressional district, except as otherwise designated by law, the decennial reapportionments of the House of Representatives and consequent changes of congressional district boundaries have sometimes placed more than one depository library in a district. In that event, the original designation is permitted to continue, and a newly created district without a depository may obtain another library designation.

The rapidly growing number of Government publications has proved a burden to many depository libraries that are unable to provide room for an accumulation requiring annually of each library approximately 150 feet of shelf space.

SELECTION PLAN FOR DEPOSITORY LIBRARIES

In recent years the annual appropriations for the Government Printing Office provide that no part of the sum for the Superintendent of Documents shall be used to supply depository libraries with publications not requested by such libraries. This provision resulted in the selection plan of distribution, but as yet it has not been perfected to the satisfaction of either the libraries or this office.

It is hoped to work out a more practical method of depository library distribution and thus be able to furnish depository libraries all the publications that are of real interest to their respective readers, while at the same time end the gross waste of publications that are of little or no use to many depositories.

The appropriation for supplying books to depository libraries amounts to \$85,000 annually, and this sum is practically exhausted every year.

PROGRESS ON EXTENSION TO MAIN BUILDING

Slow progress was made during the year in constructing the 8-story and garage extension of the main building of the Government Printing Office. The delay was due partly to unexpected foundation troubles and partly to a strike which caused a standstill of all work on the extension for two months.

The contract required completion of the building by May 11, 1930. However, the delays will make it impossible to complete the work until about next September. The Government Printing Office will thus have had to wait more than four years for the much-needed extension which the Public Buildings Commission approved on May 25, 1926. At that time the Treasury Department was directed to prepare building plans for the expenditure of \$1,250,000 in accordance with the Public Printer's recommendation.

The land purchases and condemnation proceedings, although involving property that cost only \$27,486.60, consumed nearly two years' time before building operations could be started under the contracts awarded by the Treasury Department.

On account of the long delays the extension was only about 50 per cent completed on December 26, 1929. The pictures printed on the inside of the front and back covers of this report show the condition of the building at that time.

All the steel work has been erected for the 8-story extension and the garage, which will contain 173,500 square feet of floor space. Six floors and the basement have been concreted, and the outside brickwork finished up to the third floor. Plumbing, heating, and electrical work is progressing as the floors become available. The garage has been inclosed and could be used now if not occupied by the building contractors as a temporary workshop.

PLANS FOR OCCUPATION OF NEW SPACE

Plans and preparations have been completed for occupying the extension as soon as it is ready next fall. Two floors have been assigned to the division of construction and maintenance for its carpenter, paint, electrical, machine, pipe-fitting, and metal-working shops, which will be moved from the old 4-story building. Two other floors will be occupied by the clerical force and library of the Superintendent of Documents. An entire floor will be devoted to special presswork and another one to the division of tests and technical control, including its laboratory, and ink and roller-making sections.

The extensive files of the office will be moved from their hazardous location in the old fire-trap structure to the top floor of the fireproof extension. An automatic conveyor 350 feet long will connect the file room with the division of accounts.

The first floor front on G Street side of the extension will be used as a book store and sales office for the Superintendent of Documents. A special lift and conveyor will keep the sales office in direct communication with the immense stock of publications stored nearly a block away and will greatly facilitate prompt service to the public.

It is planned to make the sales office an attractive feature of the new extension in the hope of further encouraging and increasing the sale of Government publications. The location will be convenient to the street-car lines on Massachusetts Avenue and the principal motor thoroughfare to the Union Railway Station close by. A prominent electric sign will also indicate the new location of the Government book store.

Other space on the first floor of the extension, facing the alley, will be occupied by the large maintenance stores now located in the old building.

Additional room will also be provided on other floors for necessary expansion of the platemaking division.

Other space likewise has been reserved on the second floor for additional Congressional Record presses which will be needed in a short time.

GARAGE FOR FLEET OF MOTOR TRUCKS

The one-story garage has a street-level floor space 52 feet in width by 175 feet in depth. A basement of equal size will be accessible to motor trucks with the installation of a 16-ton elevator, the largest in Washington. The garage will be big enough to store the entire fleet of 29 motor trucks and several automobiles required for hauling supplies and products. At present the office trucks and cars, when not in use, are stored in partially inclosed alleyways, interfering seriously with the operations of the delivery section. The basement of the garage will be used for truck repairs and dead storage.

The basement under the main extension will provide additional space for the storage of paper to be unloaded from trucks which will be lowered by elevator to the level of the basement floor so as to minimize handling. A passageway at the same level will make it possible to haul paper and other materials to the large storage spaces under the present main building.

With the removal of the shops and stores from the old 4-story building at the corner of North Capitol and H Streets, that ancient structure, erected in 1856, will be used as a warehouse for paper and other materials. Unfortunately, owing to its age and weakened con-

dition, the floor-load limits are very restricted. Less than half of the space can be utilized with safety, according to load limits fixed by engineers many years ago.

OLD BUILDING SHOULD BE REPLACED

The old building, with its wooden floors and supports and its rambling interior construction, has been repeatedly condemned as a fire trap and a serious hazard to the entire plant. It ought to be torn down and replaced as soon as possible by a modern fireproof structure having a frontage of at least 384 feet on H Street and 175 feet on North Capitol Street, the space now occupied by the old 4-story building and the documents office. An 8-story building of that size would cost approximately \$4,000,000.

A new building is urgently needed for adequate warehouse facilities and for safe storage of the immense stock of valuable publications which this office has to maintain for sale and for use by other departments of the Government. With the rapidly increasing work of the Government Printing Office, additional room will also be needed soon for the bindery and printing divisions. They are already badly crowded and have no other space available for necessary expansion.

In such a structure space could also be provided for storing and mailing the vast number of documents printed for distribution by Members of Congress. These documents are now delivered to the Capitol for storage and subsequently conveyed to the city post office, near the Government Printing Office, for transmission through the mails.

Storage in a building adjacent to the Government Printing Office would make it possible to carry all these publications only a short distance from the workrooms to the new warehouse, from which an automatic conveyor could deliver them direct to the city post office in a few minutes. In the same way the millions of publications mailed annually by the Superintendent of Documents are now carried by a belt conveyor, with a capacity of 360 sacks of mail an hour, running from the documents building through a tunnel to the city post office.

STORAGE FOR CONGRESSIONAL DOCUMENTS

The plan here proposed would be far less expensive than the present slow and cumbersome method of handling the many hundred thousand documents printed annually for congressional distribution. But an even more important reason for the storage of documents in a fireproof building at the Government Printing Office is that there would no longer be need to use a large part of the Capitol as a

warehouse for such inflammable materials. The recent fires which seriously threatened to destroy the Capitol and the Executive Office revealed again the grave danger that lurks in the accumulation of old documents in places unsuited for such storage.

Therefore, the Public Printer suggests that it is timely to consider the erection of another building at the Government Printing Office for the storage and mailing of congressional documents, as well as to provide a fireproof warehouse for its own great stores of documents, papers, and other valuable materials.

If Congress desires, it could continue control over its documents stored in the Government Printing Office and designate the personnel required for that work in the same manner as the Senate and House supervise their respective folding rooms. Separate and exclusive space could be assigned the documents for Senators and Members with all the safeguards and service of the present folding rooms at the Capitol.

RECONSTRUCTION OF HARDING HALL

Harding Hall, the auditorium of the Government Printing Office, named in honor of the first printer President, is now being reconstructed to provide more comfortable space for assemblage and recreational use by employees. It is expected that the work will be completed the latter part of February, 1930.

When the roof on the main building was raised in 1922 to convert its attic into an additional story for the cafeteria, the apprentice school, and the photo-engraving section, a large room was also provided for assemblies of employees and for exhibitions, entertainments, lectures, and other purposes of benefit to the Government Printing Office. This utilization of the attic added a total of 45,000 square feet of serviceable floor space in the main building.

The low height of the hall was the same as the remainder of the newly constructed eighth story, covered by a concrete roof with massive beams and girders supported at the center by a long row of large columns. These obstacles were found to affect the acoustics of the hall, and the columns interfered with the seating and view of the audience. The low ceiling also prevented proper ventilation and made the hall too hot for use during the summer months.

However, even with such handicaps, the hall was a great improvement over the old gathering place of employees on the stairs and in the small hallways between the workrooms of the sixth and seventh floors, where infrequent exercises were held before the opening of the new hall.

NEW AUDITORIUM TO SEAT 1,800 PERSONS

The popularity and usefulness of Harding Hall during the last seven years encouraged the Public Printer to propose its improvement. The plan received the cordial approval of the Joint Committee on Printing, which authorized the Public Printer to proceed with the work. As a result, a new roof has been erected over the hall, providing a ceiling height of 20½ feet, and permitting removal of the center columns by the use of 70-foot steel trusses. Artistic arched windows add much to the decoration of one side of the hall and ventilator windows admit plenty of air and sunlight on the other side. With a balcony for 300 persons, the seating capacity of the reconstructed hall will be approximately 1,800.

The hall is to have a well-equipped stage, for which the Government Printing Office Cafeteria and Recreation Association has generously offered to contribute sufficient funds. In this connection, the Public Printer desires to express hearty thanks to the Secretary of the Treasury for considerable equipment, including an elaborate light-control board, which he kindly transferred to Harding Hall from a theater acquired recently by the Government. This board will control the stage and auditorium lighting with color and dimming effects.

A new system of heating and ventilation similar to that used in modern auditoriums will be provided for the comfort of employees. The plastering will be suitably ornamental and treated to improve the acoustics of the hall. A fireproof projection room has been built on the balcony, and the employees plan to equip it with motion-picture machines, so that from time to time they may enjoy entertaining and educational pictures.

When the hall is not in use for other purposes, products of the office will be placed on exhibition from time to time.

As soon as the hall is completed, the regular weekly concerts of the 24-piece orchestra of employees will be resumed during lunch periods on Fridays. These concerts have come to be one of the most delightful and inspiring features of the office and are also enjoyed by many visitors.

CHRISTMAS ENTERTAINMENT FOR CHILDREN

On account of the reconstruction work, the Cafeteria and Recreation Association was unable this year to hold its annual Christmas treat and entertainment for the children of employees, but it is hoped that these charming affairs will be resumed during the holidays of

1930 and become a permanent event. The Christmas entertainment of 1928 brought joy and good cheer to more than 2,000 children and gladdened the hearts of everyone in the office. Such happy occasions more than compensate for all that has been expended to improve Harding Hall for even more enjoyment in the future.

Part of the work of reconstructing the hall has been done under contracts approved by the Joint Committee on Printing, and part is being done by the division of construction and maintenance of the Government Printing Office. The division has also been kept very busy throughout the fiscal and calendar year 1929 with many new projects for the improvement of the plant. It has also carried on the regular maintenance work, all of which is done by a force of 309 employees, including machinists, electricians, metal workers, pipe fitters, carpenters, painters, and other building trades.

ADDITIONAL SPACE IN THE MAIN BUILDING

Several additional mezzanine floors were erected during the year for lockers removed from the work floors to provide more space for productive operations. The office now has 6,289 square feet of mezzanines, constructed in the last eight years to provide for lockers and storage, which released for other use a similar amount of space on the work floors.

Another workroom was added during the year by bridging over an open court and providing 1,430 square feet of floor space for bindery storage and paste making. In all, 25,612 square feet of floor space have been similarly added during the last eight years by partially filling in the open court between two wings of the main building and bridging over other available space.

The reconstruction of the former attic of the main building into a full story and the acquisition and inclosing of an alley between the buildings also added 56,520 square feet; making, in all, a total of 88,421 square feet of additional space that has been converted to good use in the last few years.

The limit of possible space within the present property has now been reached, and no further room can be provided until the new extension is completed.

With the new extension and garage, the Government Printing Office will then occupy a total of 952,918 square feet, including the space used by its employees in the Capitol and the Library of Congress.

STRAIGHT-LINE LAYOUT FOR PRODUCTION

Extensive rearrangement of the machinery and equipment in several of the large workrooms required the moving of many machines and shop furnishings as well as the building of considerable

new equipment, during the past year. This work also kept the construction sections very busy for several months. In planning the new layouts for the workrooms, the Public Printer sought to adopt the most efficient methods of straight-line production, so as to lessen the labor and better the working conditions for employees.

In carrying out this program during the summer and fall of 1929, radical changes were made in the arrangement of a number of major work sections, including the monotype correcting and assembling room, the linotype section, the imposing, lock-up, and title-page groups, the electrotypes and stereotype sections, the job pressroom, and several sections of the bindery. All of these changes have worked out satisfactorily and greatly expedite handling the work in a more orderly and systematic manner.

An interesting feature of the innovations was the installation of a 48-foot belt conveyor, operated by motor power, for carrying galleys of type direct from the monotype casting room through a hallway to the assemblers in another room. The automatic conveyor relieves employees of continually carrying from one room to another the immense output of 129 type-casting machines which formerly they had to handle. Now these employees can devote more time to casting operations. The conveyor has been operating successfully for several months and has already saved in labor expense more than its cost.

PRODUCTION MANAGER REPORTS IMPROVEMENT

The recent rearrangement of the workrooms has been commended as follows in the annual report of the production manager:

Under the Public Printer's personal supervision the machinery and equipment of the entire printing division has been rearranged to be more in line with modern production methods. One of the first moves was to consolidate the work of hand compositors employed in the monotype section, so that closer supervision could be had and at the same time move about a third of the compositors from a position where it was difficult to get proper ventilation and where it was necessary to work under artificial light day and night. In the new location there is excellent daylight and ample ventilation. The old location is used for the storage of type only.

Also, the make-up banks and the proof presses were all placed in one central location in the monotype correcting room, instead of being scattered over the whole room in six different locations. The centralizing of the proof presses has resulted in one man doing the proving most of the time instead of three, thereby releasing two men for regular composition work. The sliding bank, used for galleying the type from the casting machines, was moved to a location in the casting room that reduces by about 50 per cent the walking distance of the castermen, and at the same time permitted the installation of a belt-conveyor system to convey the type from the casting to the assembling room.

The next change was to move the foundry lock-up group from the sixth floor to the seventh. Formerly all matter to be locked up for the foundry was set and made up on the seventh floor, then sent down to the sixth floor to be locked

up, and then hauled back to the molding room of the foundry on the seventh floor. As this method necessitated the use of elevators from seventh floor to sixth floor and back again, it can be seen that a great deal of time was wasted. Now all work is trucked direct from the make-up banks to the lock-up stones, then into the foundry molding room, all on one floor.

When the foundry lock-up section was moved to the seventh floor from the sixth the space vacated permitted the moving of imposing stones in the hand section so as to permit the dropping stones to be placed immediately adjacent. The lock-up furniture and the chases do not now have to be carried the length of the room when wanted by the lock-up men.

The largest move of all, however, was the rearranging of the patents section and the linotype section. Part of the 96 linotype machines in the linotype section were so rearranged as to install 24 new machines in the same space occupied by the 20 machines moved to the patents section. This increased the linotype section machines to an even 100 and the patents section from 42 to 62.

The addition of 24 modern machines to the linotype section increases our facilities for setting the Congressional Record and doubles our facilities for setting congressional bills. The transfer of 20 machines from the linotype to the patents section also permits the latter section to do all its composition for an average of 1,000 patent specifications every week, instead of having to each week call on the linotype section for the use of 10 to 30 machines.

By the move in the patents section all assembling, make-up, lock-up, stripping, and press equipment were rearranged so that there is no back tracking during the progress of the work. As the type comes from the machines it has a clear and uninterrupted track straight down the room to the presses.

Several important changes have been made in the layout of the three floors of the binding division, also under the personal direction of the Public Printer, saving space, reducing labor, and improving supervision. The addition of a new room on the fourth floor in the court between the two wings of the building made space for a better location of the paste and glue room and at the same time added storage space. Portable tables with brakes have been built to replace the old permanent tables, with considerable saving of labor in moving work in process of manufacture.

Moves are under way on the fourth floor in anticipation of the connection of that floor with the new building now under construction. All signature presses were moved from the pamphlet bindery to the old building, making way for new folding machines ordered and being installed and at the same time bringing the signature presses nearer the signature storage room.

In the molding and stereotyping sections considerable changes have been made in rearranging the equipment in this room which will assist in advancing the work more expeditiously and systematically, and it is believed a much larger increase in production will be reported at the close of the 1930 fiscal year.

NEW MACHINERY INSTALLED DURING YEAR

Along with improving workroom conditions, during the year there has been the replacement of many worn-out machines by new and more efficient equipment, which likewise has greatly helped to increase production and improve the quality of the work.

Among the outstanding accomplishments was the installation of 45 new monotype casters with 60-pica attachment to replace an equal number of old machines worn out by almost continuous work for

8 or 16 hours daily during the last 22 years. With the purchase of 47 similar machines in the preceding year, the office now has 92 monotype casters of the latest model.

In addition, there are in operation 34 other machines that have been retained for casting sorts, 2 material-casting machines, and 1 giant caster, making 129 monotype casters in all. Equipment for these casters includes 216,480 matrices, 683 die cases, and 650 molds.

During the year, 10 new 90-em scale monotype keyboards were procured to replace an equal number of obsolete models, thus bringing the equipment of 90-em keyboards up to an even 90, all of which have been installed in the last five years to replace older and less efficient machines. The office also has one 60-em keyboard.

The monotype equipment of the Government Printing Office is now the best as well as the largest of any printing office in the world.

BETTERMENT OF THE MONOTYPE EQUIPMENT

Many other improvements have been made during the last eight years in the equipment and operation of the monotype machines, including complete replacement of gas-heated metal pots with electrically heated ones. The change has improved the quality of the type and decreased the temperature of the room, which had been almost unbearable during the summer months with the large number of gas-heated casters in operation.

The electric heating is controlled from a central board by which groups of casters can be cut off when not in use. The new control system has secured production for 78 per cent of the time the casters are heated, as compared with only 35 per cent production time when a larger number of idle casters were kept heated.

During the fiscal year 1929 the new machines also cast more type per hour than in 1928. The increased production has reduced the cost approximately one-tenth cent per thousand ems of type, a saving of several hundred dollars annually.

The monotype section started the production of machine-leaded composition on August 1, 1928, and has carried it on successfully ever since. By setting matter machine leaded, the monotype section has reduced to a minimum the casting of leads for insertion by hand, thus releasing a casterman for type work. The machine leading of monotype matter will save many thousands of dollars and also eliminate the many end-letter slips in locking up for plating or press. It puts all monotype composition also on a nondistribution basis.

Other substantial monotype economies have been effected in the use of a new style of fractions made to run in keyboard composition, and in the better handling of approximately 75,000 pounds annually of keyboard paper rolls, which are now placed in boxes and located more conveniently for the operators.

Automatic ingot feeders are soon to be installed on every monotype caster to replace hand feeding of metal and maintain a more uniform temperature.

WORLD'S LARGEST BATTERY OF LINOTYPES

Twenty-four of the latest model (No. 25) linotype machines with two magazines and mixer distribution of matrices were installed in September, 1929, bringing the total number of such machines bought in the last five years up to 72. This completes the reequipping of the document and Congressional Record composition section.

The Government Printing Office now has more linotype machines than any other printing or newspaper office in the world, with a total of 174, including an intertype. All these machines are equipped with electrically heated melting pots and automatic ingot feeders. For their operation, the office has 601 magazines and 1,159,466 matrices of various faces and sizes of type.

Two new model ludlow typographs were purchased recently to replace an older type. They are used largely for ruled and blank forms.

Several new presses have been procured during the year for the rapidly increasing work of the press division, including 4 more vertical job presses, 2 high-speed cylinder presses, 21 by 28 inches, and 3 fast envelope presses. A new 32-page web press for the printing of congressional speeches and documents is on order and promised for delivery in February, 1930.

BINDERY MACHINERY AND EQUIPMENT

The bindery was equipped during 1929 with 7 new folding machines, including 2 double 16s, 3 cutting and trimming machines, 1 ruling machine, 1 wire-stitching machine, 1 cover-stamping press, 1 back-gluing machine, and extensive improvements on 2 gathering, stitching, and covering machines.

The most noticeable improvement in the bindery, however, was the replacing of stationary work benches with 78 movable tables, which greatly facilitates the handling and moving of all bindery products. All the tables are of convenient size, and equipped with wheels and brakes so that they can be moved or made stationary. The tables were designed and built by this office.

Additional machinery for the platemaking division has had to await completion of the new extension, but some equipment was purchased during the year, including another automatic plate-finishing machine, and a new leveling table with blower for use with the electrically heated electrotype pot.

There was also installed a 5-ton electrically heated and controlled stereotype pot with automatic pump and five water-cooled casting boxes for the production of Congressional Record and speech plates.

MACHINERY EXPENDITURES IN EIGHT YEARS

During the last eight years it has been necessary to expend \$1,328,264.30 in the purchase of new and more productive machines to enable the Government Printing Office to keep pace with progress in printing, binding, and platemaking and to handle its immense and steadily growing volume of work.

In expenditures for machinery, the Public Printer is limited by Congress to \$200,000 annually, which is not enough for ordinary replacements of obsolete and worn-out machinery in a plant operating 961 production machines, valued at \$3,358,080.17.

However, excellent progress has been made in the necessary re-equipment of the office. It is now up to date in nearly every kind of machinery as well as modern methods of production, according to the opinion of many prominent employing printers who visited the office during the recent convention of the United Typothetæ of America.

In this connection, the Public Printer is pleased to quote the following statement from a letter written by the secretary of the Canadian office of the International Association of Machinists, Mr. George E. Wright, of Montreal:

You, sir, and the Government you serve, are to be congratulated upon the efficiency and cleanliness of your great printing establishment, as well as upon the splendid facilities afforded the working staff.

APPRENTICE-SCHOOL GRADUATION EXERCISES

Like any other school or college, the principal event of the year for the Government Printing Office apprentice school was, of course, the graduation exercises in Harding Hall on April 18, 1929. Forty-nine young men who had completed the prescribed 4-year course of training were presented with certificates of qualified journeymen, entitling them to work at their chosen trade in the Government Printing Office.

The exercises were presided over by the Deputy Public Printer, Mr. John Greene, who has general supervision of the school. Presentation of the certificates was made by Mr. Burr G. Williams, chief instructor of apprentices. Music was furnished by the Government Printing Office Orchestra under the leadership of Mr. William C. Buckingham.

The principal address was made by the Rev. James Shera Montgomery, D. D., chaplain of the United States House of Representatives, who spoke on *The Effective Life* and thrilled a large audience

of apprentices and their friends with an earnest and eloquent presentation of his subject. Doctor Montgomery also delighted the apprentices in recalling some of his own youthful experiences at the printing trade.

On behalf of the graduating class, its president, Mr. Franklin R. Horstman, chose Appreciation and Loyalty as a subject of his remarks to the undergraduates. He urged them to recognize the "partnership" that should exist between employee and employer through appreciation and loyalty, and counseled faithful observance of office rules and regulations as the surest road to happiness and success.

GRADUATING CLASS PRINTS BOOKLET

In honor of the occasion, the graduating class prepared and printed an attractive booklet, done in colors, containing individual pictures of all the members of the class, a group picture of the apprentice school, reproductions of the written certificate of an apprentice 40 years ago and of the artistic certificate now in use, together with several other illustrations and articles relating to the Government Printing Office.

The graduation in 1929 was the third formal program in honor of such an event since the reestablishment of the apprentice school by the present Public Printer on July 5, 1922. These exercises are held annually whenever a sufficient number of apprentices in the various printing and mechanical trades have completed their 4-year courses of training.

GRADUATES EMPLOYED AS JOURNEYMEN

Including the class of 1929, the school has graduated 128 apprentices, all but 7 of whom are now employed as journeymen in the Government Printing Office. Owing to their special ability several have already been advanced to preferred positions, and all of the graduates have made good in their work.

Since the establishment of the school, 360 apprentices have been appointed through civil-service examinations requiring at least an eighth-grade education, special trade aptitude, and physical fitness. There are now 162 apprentices in the school, the maximum number of which is limited by law to 200. About 50 appointments are made annually to keep the school in proper proportion for the four years of training.

Although the printer apprentices are first instructed in a special schoolroom well equipped for such work, most of the training is done in the regular workrooms. Under the direction of competent instructors, apprentices engage in actual production of value to the office as well as of benefit to themselves.

PRODUCTIVE WORK OF APPRENTICES

The apprentice section alone set 27,486,000 ems of type during the fiscal year 1929. Part of this composition was used in printing 1,167 jobs for other departments of the Government, 307 of which were run on the presses in the schoolroom. Numerous publications for the use of the Government Printing Office are also set up and printed by the apprentice school, including the directory of employees, cafeteria menus, programs, plate catalogues, and daily work summaries.

The apprentices to other trades are also engaged in productive work, the total value of which for the year, based on regular scale of charges for the product of journeymen, was \$122,689.89. During the year the apprentices, other than printer, were employed 18,317 hours on presswork, 52,034 hours on machine and hand operations in the bindery, approximately 10,000 hours at platemaking and photo-engraving processes, and 2,000 hours on machine-shop work.

Unfortunately, many apprentices, although certified by the Civil Service Commission, have been found to lack sufficient education to begin learning a trade, particularly that of printing, which requires accurate knowledge of writing, spelling, grammar, punctuation, and other subjects of useful information.

LACK OF EDUCATION A HANDICAP

The difficulties experienced with the apprentices who have not had proper preparation in the common schools are stated as follows in the annual report of the chief instructor:

We are convinced from the experience of the past six years that too many young men are seeking to enter the trades without sufficient preparation.

This is particularly true of those who elect to take printing. They can learn the purely mechanical part of the work reasonably well and quickly if they are rightly inclined toward work, but as for making competent proof readers, key men, and executives they are poor material to work upon.

Few young men coming to us can spell even reasonably well. Thus the young man is handicapped in his work and the office is not getting the most for its outlay.

The general average in the last 10 spelling tests of the group which will finish during the year is only 70.5.

We would like to urge that high-school training be a requirement to entrance upon the training for printer and that spelling be given much greater weight in the rating of the civil-service examination.

It may be argued that the boys should attend school while at the trade, and this could be done (is done) much to their advantage. But many of the boys coming to us are here because they do not want to go to school, and the effort they put in is only perfunctory. Young men may live in the country where there are no facilities; conditions at home may be such that the services of the boy are required. This would not stop the ambitious lad, but we do not get many of that class; they are more apt to be looking for a soft spot.

There are few, if any, opportunities to take up the subject (spelling) needed most in the school. English may be had with spelling incidental, but spelling and division of words are not taught in the night schools of the District of Columbia. We are supplementing this work by giving spelling tests as regularly as the work permits.

It has been our experience that most of the young men who quit school to enter the printing trade do not realize the amount of work it requires to learn a trade. They do not like school work, so quit, and soon find that they do not like the work of learning a trade either, and from then on it is a struggle to keep them going.

The general public expects the printer to be a master of rules of spelling, grammar, punctuation, and correct composition.

DISTINGUISHED VISITORS ADDRESS SCHOOL

The apprentice school and the Government Printing Office were honored during the year with visits and addresses by Mr. J. R. Riddell, principal of the London School of Printing, and Herr Franz Helmberger, of Berlin, director of the German Government Printing Office (the Reichsdruckerei), which is also engaged in the training of apprentices.

Mr. Riddell was tendered a reception on the occasion of his visit to the apprentice school, September 14, 1929. His remarks concerning the splendid work of the London School of Printing in the training of apprentices and sons of British master printers were very interesting and instructive, as was his fascinating sketch of the famous Worshipful Company of Stationers, presided over by the Lord Mayor of London, who is also a distinguished printer.

Director Helmberger kindly greeted the officers and apprentices of the Government Printing Office at an assembly on November 21, 1929, when he came to return the courtesy of a visit that the Public Printer had made to Berlin last May. Mr. Helmberger spoke in German, but his remarks were translated by an office interpreter as follows:

When I left my own Government Printing Office and my own country to come to America, I felt as though I were coming to a land where I would feel like and be treated as a stranger—an alien.

Strangely enough, the reality has been quite the opposite; I have met with a cordial welcome wherever I have gone in your country. I have been made to feel entirely "at home" amongst the representatives of the printing craft in America; and particularly do I feel at home at this time, talking to you, young men, apprentices, neophytes in that greatest of all arts—printing. It is hard for me to realize that you are not really my own class of apprentices in the Reichsdruckerei in Berlin.

In this connection I wish to pay a just debt to your own Mr. Carter. It was he who was the real cause of my taking up the work of training apprentices in our office some five years since. During the early days of our acquaintanceship in Berlin it was his enthusiasm on the subject of training young men as general all-round printers that inspired me to again take up the work, after the lapse of some 20 years, during which time we had no apprentices.

Five years ago we adopted the apprentice system, and do not believe I can be accused of egotism when I say that it has proven a success. Our boys are thoroughly in earnest and deeply interested in their work.

Mr. Carter has directed your attention to this book [the Semi-Centennial Yearbook of the German Government Printing Office], as a product, typographically, of our apprentice school, and I will admit it is a creditable piece of work, yet that is but one of a great variety of products of our school. As I have already stated, our apprentices are taking their training quite seriously.

And now, boys, I want to say a few words to you personally. Begin at the bottom; be thorough in everything that you do; become master first of one branch of the art, after which you will find it quite easy to master the others.

I feel that I really know your chief, Mr. Carter, and so I would impress upon you this fact: That he is deeply interested in each one of you; that he wants you to be a success in your life work, and I am confident, if you do your part here, you will be able to go on, either in the service of your Government or in commercial life, without ever bringing discredit to the craft or to our patron saint, Gutenberg.

And so now I will leave you with that ancient of benedictions, "Gott grüß die Kunst" (God bless the Craft).

On his return to Berlin, Director Helmberger addressed the following letter of thanks to the Public Printer under date of December 21, 1929:

I desire at this time to express my most sincere appreciation of and thanks for the most cordial reception and most kindly assistance on the occasion of my recent visit to the United States.

Among the many impressions that remain with me, and will prove of assistance to me in my efforts to improve the Reichs Printing Office, is the picture of a model plant, whose technical perfection lends itself to a maximum of production.

PUBLIC PRINTER ADDRESSES TYPOTHETÆ

In recognition of the work done by the Government Printing Office in the training of apprentices, the Public Printer was invited to address the educational session of the United Typothetæ of America at its annual meeting in Washington on September 17, 1929. Speaking to that large gathering of the representative employing printers of the United States and Canada, the Public Printer said in part:

"I appreciate the kind invitation of your chairman to participate in this session devoted to education and to talk to you about training and research at the Government Printing Office, which in recent years has manifested a deep interest in both of these subjects.

"It may be recalled that I spoke at the Washington convention in 1923 of the work which the Government Printing Office had then begun in the training of apprentices and the testing and standardizing of printing materials. I am pleased to report that this work, which was just beginning when you were here six years ago, is being carried on quite successfully.

TRAINING OF APPRENTICES RESTRICTED BY LAW

"On taking office as Public Printer I was confronted with an ancient law of Congress authorizing the employment of 25 appren-

tices. Evidently this legislation was intended to restore trade training in the Government Printing Office, as it was accompanied by a Senate committee report declaring 'it is a good American doctrine to give the American boy a chance to learn a trade.'

"But, notwithstanding approval by Congress in 1895, no American boy was given a chance to learn a trade in the Government Printing Office for nearly 30 years thereafter. Then I decided that the Government Printing Office ought to school apprentices for its own work and relieve the printing industry of some of the burden and expense it had borne for years on account of the Public Printer having to obtain all his skilled workmen from those trained elsewhere.

"Accordingly the training school was started in 1922 with 25 apprentices, the maximum number then allowed by law. This number, of course, was grossly inadequate for an establishment employing approximately 1,100 journeymen printers. If union rules had applied to the Government Printing Office, it would have been entitled to many times the number of apprentices fixed by law. Therefore I submitted a recommendation to Congress to remove the restriction on apprentice training, but there was opposition to an unlimited number, and by the act of February 20, 1923, the maximum was increased from 25 to 200 apprentices at any one time. Much credit is due to the Typothetæ for its cordial support in securing this legislation, which assured the continuance and the success of the school.

1,792 BOYS SEEK TO LEARN PRINTING TRADE

"In the last seven years 1,792 boys have taken the civil-service examination for appointments as apprentices in the Government Printing Office. Although many of these lads failed to qualify for training in the Government office, it seems worth while to have encouraged nearly 1,800 lads to seek to learn a printing trade. I hope that many of those who could not be chosen by the Government office have been able to satisfy their ambition in other printing plants throughout the country.

"From the opening of the school on July 5, 1922, to date, 360 apprentices have been appointed at various times. Of that number 128 have completed the 4-year course for qualification as journeymen in their chosen trades and 162 are in training at present.

"Every graduate is offered permanent appointment and nearly all have continued in the service of the Government office. Almost a fourth of the graduates have already earned advancement to preferred positions, some of which pay more than \$3,000 a year.

"Half a dozen of the Government-trained apprentices are among the top-notch linotype operators, with averages of from 5,000 to 6,600 ems per hour. Eight other graduates are operating monotype key-boards, with averages of from 7,900 to 10,500 ems per hour.

"A few years ago a number of these boys were working as messengers in the Government Printing Office for \$900 or less a year, with small chance for advancement and no opportunity to learn a worthwhile trade. The privilege of helping these lads has given me the greatest joy of my service as Public Printer.

NEED FOR BETTER PREPARATORY EDUCATION

"Training of apprentices has convinced me that the American youth needs a much better education than he now gets in preparation for employment at the printing trade. The common schools seem to be failing to give our boys and girls the fundamentals of an education that will help them throughout life. Teaching of the 'three R's' appears to have become an abandoned art and has been replaced by a lot of fads and follies which apparently are interesting to the teacher but of little practical value to the pupil.

"It is said that we are becoming a nation of wretched writers, miserable spellers, and unthinking readers. Nowhere is this more evident than in the training of printers. It is, of course, most essential that the printer shall be able to write legibly, spell correctly, and read intelligently. The ability of the printer and proof reader to do so has saved the reputation of many an author and statesman whose reflected culture will soon be sadly dimmed unless the followers of the art preservative are better trained in the use of the English language.

"The failure of the common schools to turn out good spellers, grammarians, and writers of the English language is not alone affecting printers but is also seriously embarrassing college students, especially those in training for newspaper work. Referring to students whom he had instructed in a school of journalism, James W. Barrett, city editor of the New York World, said recently:

"The plain and simple fact is that a great many of them can neither spell, write, nor read a newspaper intelligently. Instead of taking courses in feature and editorial writing they should take high-school or grammar-school English.

MANY FAILED TO PASS CIVIL-SERVICE TEST

"Although every applicant for appointment as an apprentice in the Government Printing Office is required to have completed the eighth grade of a common-school education, which is assumed to include thorough instruction in spelling, writing, grammar, reading, and arithmetic, 821, or nearly half, of the 1,792 applicants failed to pass the civil-service examinations, 70 points of which are based on mental tests and only 30 points on mechanical aptitude.

"If the schools had properly educated the 1,800 boys who sought to become useful citizens by learning worth-while trades in the Government Printing Office, 821 of them would not have failed to qualify for training on account of lack of mental ability. These boys were doomed to bitter disappointment at the very beginning of their career, and I charge that their failure was due largely to the inadequate education which they had received in the common schools.

"A surprisingly large number of the 360 who became apprentices have been found deficient in spelling and grossly ignorant of the rules of syllabication, punctuation, and capitalization, notwithstanding all of them had completed the eighth grade of a common school and many of them had attended high school. On this account it has been found necessary to require many of our apprentices to continue

the study of spelling and grammar and become more versed in the proper use of the English language so that they might qualify as competent printers.

DIFFICULT TO OBTAIN GOOD PROOF READERS

"With civil-service examination and apprentice-school tests revealing such an appalling lack of elementary knowledge by those who have had a common-school education, it is evident that the situation must be much worse in the commercial field, where the educational requirements are less exacting. Ample evidence of the insufficient education of printers in general is disclosed by the inability of many of those who have been trained elsewhere to qualify as proof readers and copy editors in the Government Printing Office. It is now almost impossible to obtain competent proof readers from any source, and I am sure the Government Printing Office is not alone in such serious difficulty.

"Typesetting machines and the demands of the newspapers for top speed and early editions have practically ruined the art of proof reading for daily publications. In the stress of furnishing men for mechanical situations, the trade-unions have not maintained the educational qualifications which are the most essential tools of competent printing craftsmen. Therefore it is all the more vital to the future of industry that organizations like the Typothetæ manifest, as you are doing here to-day, greater interest in educational work.

IMPORTANCE OF SOUND GENERAL EDUCATION

"The importance of a sound general education has been so well stated in the Prospectus of the London School of Printing that I shall take the liberty of better expressing my thoughts on the subject by quoting from the publication issued by its distinguished principal, Mr. Riddell, whom we are delighted and honored to have with us to-day. I read as follows from the statement of the London School of Printing:

"In the whole realm of industry there is no other craft in which sound general education is of such paramount importance as it is in the printing and kindred trades. It is the one craft which gathers within its wide circumference every phase of human knowledge and expression and which deals with every subject known to human experience and research. How vital, then, is the necessity for a good general education—an education which young students, in their anxiety to proceed to specific technical training, are apt to ignore.

"This training can only be effective when such essential subjects as English, arithmetic, and drawing have been thoroughly mastered. Progress is impossible until a comprehensive knowledge of English has been acquired. Skill in draftsmanship is of fundamental importance, and the ability to calculate accurately and rapidly is a further essential qualification.

"Without an adequate knowledge of all these subjects, students are handicapped, much valuable time must of necessity be wasted, and a good deal of technical instruction be rendered absolutely futile.

DUTY OF THE COMMON SCHOOLS OF AMERICA

"To remedy this situation the London School of Printing has included a general course of education in its training of apprentices. That may be a necessary solution of the problem in England; but,

with compulsory education laws almost universally applied to American schools, there should be no need in the training of our apprentices to undertake also their general education. This duty rests on the common schools, but unfortunately it is being seriously neglected or improperly executed.

"My chief purpose, therefore, in submitting this thought to you to-day is to urge a united demand on school authorities that they give the American youth a better education in the fundamental subjects that are essential to success in any industry."

DIVISION OF TESTS AND TECHNICAL CONTROL

The division of tests and technical control, with a staff of 37 employees, was engaged throughout the year principally in the inspection, testing, and manufacture of materials used by this office for printing and binding. The inspections and tests covered mostly paper, of which 46,110,818 pounds were inspected, and of this quantity 1,877,951 pounds were rejected for failure to comply with the Government specifications. The rejections of paper during the fiscal year 1929 were 522,741 pounds less than for the preceding year and amounted to only 4.1 per cent of the total quantity delivered.

It is believed that the decrease in rejections of paper was due partly to the adoption last year of new watermarks, which definitely indicated the respective grades of bond and ledger papers—one star for 30 per cent, two stars for 50 per cent, three stars for 75 per cent, and four stars for 100 per cent rag stock. Paper manufacturers were more careful to comply with the specifications for paper so watermarked. No paper was accepted which did not conform fully to the specifications for the respective grade watermark. Similar watermarks will be required in paper to be purchased during the coming year, as the new marks have proved very useful and satisfactory.

CORNSTALK PAPER FOR GOVERNMENT USE

Another innovation proposed by the Public Printer and adopted by the Joint Committee on Printing is a request for bids on plant-fiber book paper as a regular stock of the Government Printing Office. The specifications for this paper require stock of not less than 50 per cent bleached fiber from corn or cotton stalks, flax or cereal straws, wild or cultivated grasses, or from plants of like nature. The new item is intended especially to encourage the commercial production of paper from cornstalks, and it is hoped that a supply of such paper can be obtained for Government use in the near future.

Bids for the annual supply of all kinds of paper required for the public printing and binding during the year beginning March 1, 1930, will be opened by the Joint Committee on Printing on January

27, 1930, and the award of contracts announced by that committee a week later. Proposals have been requested for approximately 54,000,000 pounds for the coming year. Definite specifications and standards have been adopted for the entire schedule, and the Joint Committee has ruled that proposals based on bidders' samples will not be considered.

The Government is always assured paper of the standard qualities fixed upon and contracted for by the Joint Committee on Printing, as the Public Printer is forbidden by law to accept any paper that does not conform to the standard specifications in every particular. Acceptances are determined for the Public Printer by physical, microscopical, and chemical tests made by the laboratory of the Government Printing Office.

SAMPLES TESTED BY THE LABORATORY

In the fiscal year 1929 the laboratory tested 4,800 samples of paper and paper products, as compared with 5,376 samples tested during the preceding year. In addition, 2,808 samples of other materials for printing and binding were tested, including textiles, metals, glues, ink-making materials, lubricating oils, gasolines, chemicals, soaps, waxes, etc. The decrease in paper tests is due to larger orders, which required the testing of fewer shipments during the year.

Inspection and testing of envelopes purchased in the fiscal year 1929 covered a total of 40,775,860 envelopes, mostly made of kraft but varying in quality from wood manila to the highest grades of bond and ledger paper. Of that quantity, 2,114,500 envelopes were rejected, principally on account of failure to meet the folding endurance requirements, which had been added to insure better quality. Along with the improvement in quality, the sizes and weights of envelopes were decreased, thus simplifying the purchases.

Next to paper, the major work of the laboratory consisted of testing control and investigational samples of type-metal alloys. These tests for the year numbered 1,134, of which 465 were on samples submitted by selected newspapers for investigational work in developing standards for linotype and stereotype use. The other metal tests were in connection with the standardizing of 7,908,788 pounds of type alloys used by the Government Printing Office during the year.

TECHNICAL CONTROL OF TYPE METALS

Since the technical control of type metals was started by this office in 1925, a total of 27,857,367 pounds of type alloys have been standardized by the remelting of about 15 tons of dead type daily. The saving effected thereby has been approximately \$400,000 when compared with the usual commercial charge for such work. The

standardization has also added 1,099,337 pounds of new type metal to the old stock of 6,630,000 pounds. The old stock had an excessive tin and antimony content. The additional standard type metal, thus gained at practically the cost of the lead, was obtained with a further saving of \$35,000.

An even greater benefit was derived from the standardization of type metals by the more economical and efficient operation of type-casting and stereotyping machines.

Technical control is also exercised in the production of inks, rollers, and glues, which the Government Printing Office makes for its own use and also for other departments of the Government in Washington.

In the fiscal year 1929 the total production of printing inks amounted to 162,135 pounds, an increase of 12,505 pounds over the preceding year. During the year 35,000 pounds of mimeograph ink was made, largely for departmental use.

MIMEOGRAPH INK FOR DEPARTMENTS

The total amount of mimeograph ink produced by the Government Printing Office during the last three years was 83,165 pounds, the commercial charge for which at the regular rates would have amounted to \$125,000. The Government Printing Office furnished this ink for approximately \$50,000, thereby saving \$75,000 to the departments on their 3-year supply.

The manufacture of bindery ruling ink was transferred recently to the ink section, which now has charge of the production of every kind of ink used in this office, including writing inks. Approximately 10,000 quarts of red and blue-black writing inks were also furnished in 1929 to the other departments of the Government.

Improvements have been made during the year in the quality of printing inks, and larger production has been obtained by the installation of the latest type of 4-roll mill. The ink section now has seven mills in operation.

Flexible glue molded for bindery use was likewise made under technical control according to definite formulas developed by this office. Glue production for the year amounted to 78,956 pounds. A large quantity of old roller composition is used in the making of bindery glues, thereby effecting a considerable saving in the utilization of this material which heretofore was considered worthless. During the year 13,182 pounds of paste and 3,110 pounds of glue were sold at cost to other departments.

The making of press rollers is another function of the technical division, which is beginning an investigation to determine the comparative life of rollers made from definite grades of glue, the value

of glycerine substitutes, and other points of interest to the pressman. During the year 3,254 rollers were made for use on the 190 printing presses in this office.

COOPERATIVE WORK IN PRINTING RESEARCH

Considerable research work has also been carried on by the division of tests and technical control in addition to its routine of inspecting, testing, and manufacturing materials as heretofore mentioned.

The principal investigations during the year were conducted in cooperation with the Employing Bookbinders of America and the mechanical department of the American Newspaper Publishers Association, each organization having employed a research associate to work with the chemists of the Government Printing Office laboratory in the study of mutual problems.

A special investigation was made during the year of the quality of kraft paper for Government specifications. Kraft paper manufacturers cooperated by furnishing many samples.

The Binders Board Association is also furnishing samples for a study of the warping of book covers, which is of interest to the Employing Bookbinders of America as well as to this office.

Progress reports on the newsprint and type-metal investigations were submitted at the mechanical conference of the American Newspaper Publishers Association in Buffalo last June. The reports as presented by the technical director of the Government Printing Office covered the work done by its technical staff in cooperation with the research associate employed by the newspaper association. Being progress reports, no definite recommendations or conclusions were submitted, but a great amount of necessary preliminary testing and research work had been done.

NEWSPRINT INVESTIGATION IN PROGRESS

In order to determine, if possible, the essential qualities of newsprint paper and ink which should be controlled to insure uniformity and to obtain the best and most economical printing results, 256 samples of standard newsprint were obtained from 149 American newspapers through the cooperation of Mr. W. E. Wines, manager of the mechanical department of the American Newspaper Publishers Association. The samples represented the product of 75 newsprint mills in the United States, Canada, and Europe, and constituted the largest collection that had ever been made of newsprint paper.

The testing of this large number of samples has taken considerable time, as the tests covered fiber content, thickness, ash, bursting strength, tensile strength, stretch, oil penetration, and ream basis weight.

In seeking to ascertain printing qualities and resistance to ink penetration, many samples were also tested for gloss or finish and for porosity or air permeability. The investigation required the development of certain special tests for determining the relationship of paper to printing ink, which may go far toward solving the present-day difficulties in newspaper printing.

An interesting statement in the report on the newsprint investigation is that the results so far indicate that the tensile-strength test is more satisfactory for measuring the strength of newsprint than the commonly used bursting-strength test.

TESTING OF TYPE METALS FOR NEWSPAPERS

The progress report on type metals was based on exhaustive analyses of linotype and stereotype samples submitted to the Government Printing Office laboratory by five prominent newspapers over varying periods of time from October 10, 1927, to May 1, 1929, when this phase of the investigation was completed. In all, 229 samples of linotype and 236 samples of stereotype metal from these newspapers were carefully analyzed for the percentages of lead, tin, antimony, and copper. The results of these tests were shown by large graphs, which are of technical interest only and are not reproduced in this report. Copies may be obtained by those interested on application to the Public Printer.

The tentative conclusions drawn from the preliminary study of type metals are printed elsewhere in the accompanying report of the division of tests and technical control. Briefly, the report states that the chief losses due to dross of linotype metal occur in the remelting process and not on the typesetting machines. The investigation further shows the importance of automatic temperature control on any pot where type-metal alloys are heated. An analysis of linotype metal once in three months is regarded as sufficient, if no serious troubles are encountered in the meantime.

The extensive tests did not establish any reason for change in the standard formula of linotype metal as previously adopted for the Government Printing Office. This office still believes that its standards of linotype and monotype metals are satisfactory for the high class of printing done for the Government.

EMPLOYING BOOKBINDERS BEGIN RESEARCH

Cooperative research work with the Employing Bookbinders of America was started on July 1, 1929, when the research division of that association placed an associate in the laboratory of the Government Printing Office to assist in carrying on investigations of mutual interest. At that time the Public Printer received the following letter from Mr. Roy C. Baker, of Boston, chairman of the research division of the Employing Bookbinders of America:

On behalf of the Employing Bookbinders of America, I want to thank you for the hearty cooperation which you and all your people have displayed toward our new project and for the attention which was given us on every hand while Mr. Van Deene and myself were at your plant. I am sure a great deal of good is going to come from this work and benefit be realized by all concerned.

In announcing to the Employing Bookbinders of America the plan adopted by its research division for cooperative research work with the Government Printing Office, a special committee headed by Mr. Baker issued a statement of its purpose and program, from which the following are interesting quotations:

The analysis of production and distribution methods to develop more efficient and more economical practices is rapidly approaching the forefront of association activity. Industrial or technical research is universally recognized, offering a great opportunity to manufacturers to develop better methods of manufacturing and more efficient methods of purchasing materials. So vital has this subject become, that Congress has authorized the various research departments of the Government to cooperate with the respective manufacturers.

While it is true that the Government will do some investigating and testing for industries which do not maintain a research associate, it is, of course, impossible for it to investigate any large problems outside of those on which it is working for the Government. A research associate placed by the bookbinding industry will devote all his time to that industry and will have the privilege and advantage of attending staff meetings and consulting specialists in allied fields of work on technical aspects of his research program. The technical division of the Government Printing Office has a great many problems outside of the bookbinding industry, and for this reason it is very essential that we have our own man, who will devote all of his time to our problems.

Several of our members have already used to great advantage results of investigations in certain problems, which the technical division of the Government Printing Office has conducted. Among these are thorough investigations on humidity, glue specifications, bookbinding cloths, destruction of bookbinding cloths by insects, imitation leather, imitation gold leaf, and paper.

In the matter of flexible glue, one member, who had been paying 15 and 16 cents a pound for glue has been making glue for the past year in accordance with a Government formula at 11 cents a pound and is better satisfied and that much more prosperous. Another member has made a saving of 5 cents a pound on end leaf paper, and is getting paper better than before. A large saving has been effected on the use of imitation roll leaf.

PROGRAM FOR JOINT INVESTIGATIONAL WORK

The research division of the Employing Bookbinders of America will function in the following way:

It will install a resident research engineer at the division of tests and control of the Government Printing Office, who will devote all his time to solving and investigating the problems which confront the bookbinding industry. The committee will gather ideas from the members and formulate and lay out work for the resident engineer.

It is proposed to adopt standard material specifications under which the members may order various materials which they purchase. By having samples tested, they are assured of getting what they order and what they pay for.

One of the first problems to be undertaken is the warping of books. This is a universal complaint as was evidenced by the fact that 32 members have written into headquarters regarding this subject. It is very evident from reports received that the binders have never attacked this problem from a scientific angle.

Among other problems which we might undertake are:

Strength of end leaf paper in relation to strength of book.

Testing of paper knives.

Developing a better method of binding books.

Size of thread to use to get maximum strength.

Wrinkling of end leaves.

Developing a uniform bindery truck.

Developing a system of fitting up covers.

Recommendation of proper oil and lubricants for bookbinding machinery and standard specifications for same.

The importance of the first glueing on the back of a book.

The causes of damage to books during process in order to reduce repair work.

It is proposed to investigate new machinery and materials. These will be tested in the Government bindery under actual operating conditions and will be approved if they are of satisfactory merit.

It is a rule of all Government departments that any information developed in Government institutions becomes the property of the public and can not be patented, so that any future developments which may be made by our research engineer will become the property of the industry as a whole. This, of course, does not prevent tests being made on any patented articles.

The Government bindery purchases all of its materials under very rigid specifications, and it would seem reasonable that the members of the Employing Bookbinders of America might adopt more uniform specifications than they now have in purchasing supplies. This would have a tendency toward uniformity of materials, which would inevitably result in a reduction in the cost.

BOOKBINDERS PLEASED WITH PROGRESS

It is gratifying to note the further statement in the January (1930) Monthly issued by the employing bookbinders' association that the research work "is going on splendidly" and that members should not be impatient if they fail to receive constant reports, as "it is not because the work is not going on as efficiently and expeditiously as possible, but rather because the division would rather report results than give the outlines of experiments as they are being carried on."

In this connection it is also pleasing to quote the following letter received from Mr. John C. Burkhardt, of Detroit, a former president of the Employing Bookbinders of America:

In sending to the membership of the employing bookbinders' association the various booklets and specification samples of material, you have done something for the industry which will be an everlasting benefit.

We have looked over the various pamphlets and samples with a great deal of interest and benefit. All this material is going to be placed where it is readily accessible and will, I am sure, be used very often to our advantage.

The annual report is most interesting and surely shows the wonderful progress the Government Printing Office has made under your administration. You certainly have every reason to be very proud of the outstanding way in which you have conducted the enormous business of Government printing.

During the year many similar letters have been received expressing appreciation of the helpful service that the Government Printing Office is rendering the printing and related industries through the cooperation of its technical division in research work and exchange of experiences. A recent letter (December 5, 1929) from Mr. A. F. Logan, production manager of the Seattle (Wash.) Times, thus expresses his thanks to the technical director of the Government Printing Office:

Your letter to our Mr. Scoville, under date of November 29, 1929, has been referred to this office for my information, and it is the purpose of this communication to tell you how grateful the Times is for your thorough, careful, and prompt compliance with the requests made by Mr. Scoville.

The analyses and conclusions contained in your letter are not only logical but extremely valuable to us, and we are glad, indeed, to find the executives of the Government Printing Office so ready to cooperate with private industry.

Another letter, from Mr. W. B. Patterson, production manager of the Rumford Press, Concord, N. H., to the technical director, states:

In conclusion, may we express to you our appreciation and admiration of the work which you are doing at the Government Printing Office. It is a distinct contribution not only to the success of that institution but to the printing industry as a whole, and many of the printers of the country are keenly alive to the fact that the present organization of the Government Printing Office has developed along such high standards of efficiency that comparisons with previous régimes only tend to emphasize this fact.

INTERNATIONAL BUREAU TO AID RESEARCH

Organized research is receiving thoughtful consideration to-day by leaders of the printing and related industries throughout the world. Research was one of the principal subjects of discussion at the Third International Congress of Master Printers, which the Public Printer and the technical director of the Government Printing Office had the privilege of attending in London last April.

The London meeting of several hundred master printers, representing 20 countries, decided to organize an International Bureau as a clearing house for technical investigation and information. The headquarters of the bureau have been established in Berlin under the auspices of the Master Printers Association of Germany.

Just prior to the international congress, a large number of British master printers and newspaper publishers met under the patronage of the Worshipful Company of Stationers in London to listen to a formal lecture on the application of science to printing. The speaker on that occasion commented at length on the research work of the

United States Government Printing Office and complimented it as an example for the British printers to consider. This discussion prompted them to appoint a committee to consider the feasibility of instituting a technical research bureau in England.

CONTACT WITH OTHER GOVERNMENT PRINTERS

Deep interest in the research work of the United States Government Printing Office is also being manifested by printing organizations of other countries. Cordial relations have been established by the Public Printer with the heads of the Government printing works in Great Britain, Canada, Holland, Sweden, Germany, France, Czechoslovakia, Austria, Japan, India, Australia, Tasmania, South Africa, and Mexico, and with the Vatican printing plant in Rome. Official visits have been exchanged in recent years with the heads of several of the Government plants in Europe.

Master printers and newspaper publishers from a number of countries have also come to Washington to inspect the Government Printing Office and study its research activities. Many others, including the Federation of Master Printers of Great Britain and Ireland and the Master Printers Association of Germany, are frequent correspondents of this office in the consideration of problems of mutual interest.

In the United States, the movement for organized printing research has made considerable progress recently with the interest taken in that subject by the United Typothetæ of America and the printing industries division of the American Society of Mechanical Engineers. Both of these organizations have held largely attended meetings to discuss the ways and means of research and have adopted resolutions indorsing the organization of a graphic arts foundation for that purpose.

ADDRESS OF PUBLIC PRINTER ON RESEARCH

The Public Printer was invited to address the annual convention of the United Typothetæ of America in Washington, September 17, 1929, on Research at the Government Printing Office. In presenting that subject, at the educational conference of master printers gathered here from various parts of the United States and Canada, the Public Printer said, in part:

"A field for educational work, equally as fertile as that of training apprentices in the art of printing, is the enlightening of master printers as to the sciences that vitally concern almost every phase of the industry. More problems of chemistry and engineering requiring scientific solution are involved in the materials and methods of printing than affect almost any other industry. These problems will have to be solved by scientific research if the printing industry is to maintain its time-honored position as 'the Mother of Progress.'

"Research has been defined as 'nothing more or less than an intelligent inquiry into how to do practical things; if they are new, how they can be done in the best way; if they are old, how in a better way.' The intelligent inquiry will, of course, have to be made by chemical engineers, but it is essential that we, as master printers, shall be capable of understanding and applying their technical advice. So I assert that the education of the master printer of to-day is as important as the training of the journeyman printer of to-morrow.

REVOLUTION IN METHODS OF PRODUCTION

"As Doctor Bird so clearly stated in a recent *Typothetæ Bulletin* article, technical research has brought about a new industrial revolution with which the printing industry must keep pace if it is to hold its proud position as a leader in the industrial world. This revolution in production methods and materials had its origin in the chemical laboratory, from which, day by day, come new ideas that are changing the ways of industry and rendering possible and profitable many things that were unknown or valueless heretofore.

"Let me also call into testimony on behalf of industrial research the words of the president of the New York Employing Printers Association, Mr. Van Dillen, who, in a published letter of August 10, 1928, approving a research foundation for the printing industry, said, 'the miracles of modern business are the products of technical and statistical research. * * * Unquestionably the best organization to undertake such work is the trade association of the industry. Outstanding results through research have been achieved by many trade associations and to them are due the vast majority of our statistical and technical research services.'

"In view of these indorsements by competent authorities, it seems pertinent now to ask what has been done by the printing industry to secure for itself the benefits of research work for which many other industries are annually spending millions of dollars. Permit me to answer this inquiry in the words of the director of your department of production management, Mr. Davis, who in a recent *Bulletin* article stated that 'no doubt the printing industry has done less in research fields than any other industry to-day.' Mr. Davis also points out that the printing industry has 'a virgin field for exploitation by research engineers' and concludes that 'research will help us solve some of our more perplexing problems.'

GOVERNMENT PRINTING OFFICE RESEARCH

"In the hope of being of service to the printing industry as well as to itself, the Government Printing Office closely followed its resumption of apprentice training seven years ago with the installation of a research laboratory to study and develop standards of printing materials, to test their quality, and to exercise technical control over their production and use.

"This work was begun in a small way in 1922, with a staff of only half a dozen employees and an expenditure for the first year of about \$13,000. The value and importance of the work has increased

so rapidly that to-day our laboratory has a score of employees, including a number of highly skilled chemists, and its cost to the Government for the past year was close to \$40,000. I mention these figures merely to show that the undertaking is no mere plaything and can not be carried on without men and money.

"With the completion next year of a large addition to our main building, nearly an entire floor of that structure will be occupied by the industrial laboratory, which undoubtedly will be the best equipped and most modern laboratory in the world devoted exclusively to printing research work.

PRINTING INDUSTRY ENTITLED TO GOVERNMENT AID

"I also regard the entire Government Printing Office as an immense laboratory which can and should be of service to the printing industry as well as to the Government. In fact, I am of the opinion that the printing and related industries are just as much entitled to receive help from the Government Printing Office in the solution of their trade problems as are the agricultural, labor, banking, and various commercial interests entitled to the aid that they have received for years from other establishments of the Government.

"As long as I remain Public Printer I intend to render such service to the great industry you represent, and I earnestly hope that this may become a permanent policy of the Government.

"The Government has no difficulty in purchasing at satisfactory prices paper made according to its standard specifications and subject to its exacting tests. I know no real reason why the commercial printer can not economically procure his paper in the same way.

"Standard qualities of paper will certainly insure fairer competition among printers, simplify the problems of stock and production, and be more satisfactory to the customers of the printer. Furthermore, the standardizing of paper would effect a considerable economy in its production, and the printer should share in this saving.

DEFINITE SPECIFICATIONS ALONE NOT SUFFICIENT

"But definite specifications alone are not sufficient to safeguard the procurement of printing materials. From time to time there must be accurate and impartial testing of the materials, whether they be type metals, paper, inks, textiles, or anything else that can be tested.

"Although technical analyses are a routine procedure in the laboratory of the Government Printing Office, I appreciate the difficulty that confronts the commercial printer to test his materials. I shall not undertake to discuss how the tests could be made for the individual printer; in fact, technical analysis may not be possible except at central points or in the larger cities.

"The Government Printing Office, of course, could not undertake the testing of materials for commercial use, as it would interfere too much with the other work that our laboratory has to do for the Government and might lessen the research service that we hope to render for the general good of the entire industry. Therefore, I suggest that

some other agency would have to be established or employed if the Typothetæ or any considerable number of its members decide to have tests of their materials made regularly.

EXAMPLES OF REJECTED PRINTING MATERIALS

"The importance of proper inspection and tests is shown by the following experiences, among many, the Government Printing Office has had in rejecting materials that fail to meet the specified standards of the Government :

"Delivery of an all-chemical wood wrapping paper, under specifications requiring at least 75 per cent jute or manila stock; manila paper with 25 per cent ground wood, offered on a specification requiring 100 per cent sulphite stock; 60 per cent rag writing paper, on specifications requiring 100 per cent rag stock; 30 per cent rag bristol board, on specifications requiring at least 50 per cent rag stock; printing papers, with an excessive weight of clay; alleged Babbitt metal, with 80 per cent of lead instead of 90 per cent of tin; wrought iron, for medium machine steel; 90 per cent mineral oil, substituted for pure neat's-foot oil; acid leathers, for acid-free leathers; textiles, grossly deficient in weave; cotton twine balls, containing 25 per cent less yardage than specified.

"These instances of deception and substitution are, of course, not typical of the many highly honorable contractors who serve the Government Printing Office faithfully and well. There may have been mistakes for which no one should be held responsible, but in any event the failure to comply with standard specifications shows the need for careful testing of materials from even the most reliable sources.

"Other functions of our technical division are to supervise the manufacture of the printing inks, press rollers, and bindery adhesives used in the Government plant. These undertakings have been entirely successful, but I am not prepared to advise adoption by the average plant. However, our experience in this work ought to be of good service to the printing industry.

SCOPE AND PURPOSE OF RESEARCH WORK

"This brings me to a statement of the scope and purpose of the research that has been and can be done by the Government Printing Office for the industry.

"I have explained in some detail the extent of the standardizing, testing, and technical control of the materials that are used in the routine work of the Government Printing Office. All of this forms the foundation for the really constructive research work which we have undertaken for the benefit of the entire industry.

"The investigations include paper, type metal, printing inks, bindery adhesives, detergents, lubricants, textiles, leathers, threads, and other printing and binding materials, as well as a study of air conditioning and other engineering problems of a printing plant. Some of the research work has made good progress and shown worthwhile results.

COOPERATIVE RESEARCH WITH TYPOTHETÆ

"The first cooperative research work undertaken by the Government Printing Office was with the United Typothetæ of America, which, at its Chicago meeting in 1924, accepted an offer of the Public Printer to assist in establishing standard grades of bond and ledger papers. An expert employed by the Typothetæ aided in preparing the preliminary report.

"For the first investigation in 1924, 33 manufacturers submitted 150 samples of their regular mill-brand papers, including 100 bond and 50 ledger papers. Owing to the interest manifested, the manufacturers were again requested in 1925 to furnish additional samples of their regular mill-brand bond and ledger papers, in order to ascertain if the tentative specifications were in need of revision, to determine the normal variation in paper of the same quality, and to stimulate additional interest in the technical standardization of the papers. Forty-two paper manufacturers cooperated in the second investigation, submitting 165 samples of their regular mill-brand papers, including 117 bond and 58 ledger paper samples.

FINAL REPORT ON BOND AND LEDGER PAPERS

"The final report was published in February, 1928, and discussed by your standardization committee at its meeting in Quebec last fall. Although the committee and the general headquarters staff were authorized by the Chicago convention to issue the specifications 'at the earliest possible date,' no further action has been taken by the Typothetæ. However, the grades proposed for bond and ledger papers have been adopted by the Government and used satisfactorily for several years.

"One of the primary advantages to be gained by the standardization of bond and ledger papers is the reduction of the number of grades to a minimum that mills may confine their production to the least number of grades possible. The proposed specifications provide for six grades each, four rag-content bonds and ledgers, and two chemical-wood grades. This number seems ample to cover the full range of the commercial use of these papers.

"The basis of the proposed classification is not rag content alone, but is rag content combined with the physical qualities of the paper. The grades of rag content are 30, 50, 75, and 100 per cent. Folding endurance is the principal difference in the two grades of chemical-wood bond and ledger papers. The bursting strength test is specified, since it is in common use by paper manufacturers, but folding endurance is deemed the more important physical test.

CONGRESS AUTHORIZES COOPERATIVE RESEARCH

"In the spring of 1928, the Public Printer submitted to Congress a formal plan for cooperating with commercial industries in developing specifications and standards for printing materials, and recommended that the Government Printing Office be authorized by law to engage in cooperative research work.

"This was done by the act of May 14, 1928, which specifically included the Government Printing Office in the list of industrial and scientific establishments of the Government that are authorized by law to offer their facilities to scientific investigators and qualified individuals for study research and the promotion of knowledge.

"Accordingly, the Government Printing Office now has the same legal right to offer its facilities for scientific investigations as has any other establishment of the Government, and the Public Printer is ready to make his facilities for research available to the printing industry for cooperative study and solution of its technical problems.

INVESTIGATIONS WITH NEWSPAPER PUBLISHERS

"By authority of this recent law, the Government Printing Office has undertaken important investigations of type metals, newsprint paper, and printing inks, in cooperation with the mechanical department of the American Newspaper Publishers Association, which has placed a research assistant in the laboratory of the Government office.

"Extensive tests have been made of samples of linotype and stereotype metals submitted by selected newspapers to determine, if possible, the rate of deterioration of alloys, the most suitable composition, and the most satisfactory method of maintaining uniform quality. The tests have already developed information of value to the newspapers as well as to the Government Printing Office.

"The purpose of the newsprint investigation is to determine the essential qualities of paper and ink which should be controlled to obtain the best and most economical results in printing. A study of the penetration of printing inks is one of the interesting features of this research work and may prove of much importance.

"The general manager of the American Newspaper Publishers Association, Mr. L. B. Palmer, has stated that the entire association is indebted to the Government Printing Office for the great interest shown in the problems of the newspaper publishers and for the hearty cooperation extended in endeavoring to find a solution of the newspaper printing problems.

EMPLOYING BOOKBINDERS BEGIN RESEARCH

"Another cooperative investigation is just getting under way with the Employing Bookbinders of America, who have likewise retained a research engineer to assist in the laboratory of the Government Printing Office. In reporting the arrangements for this work, Mr. Roy C. Baker, chairman of the special research committee, informed the Employing Bookbinders that—

"During the time your chairman and Mr. Van Deene were at Washington various conferences were held with officials of the Government Printing Office. At all times utmost cooperation was offered to your committee, and we are indeed fortunate to have available without cost the use and services and equipment of this wonderful organization. Public Printer George H. Carter expressed the desire to do everything in his power to help this project, and it lies within our organization to see that his cooperation is justified. At the various conferences, it was made very clear that this work will be of tremendous importance to the industry.

"From time to time the Government Printing Office, through its division of tests and technical control, has also cooperated with other

national associations, especially the National Association of Glue Manufacturers, and has likewise received valuable advice and aid from the manufacturers of paper, type metals, and other printing and binding materials.

FULLY 2,500 INQUIRIES RECEIVED ANNUALLY

"In addition to the research cooperation with industrial organizations and the manufacturers of printing materials, the technical division endeavors to study and answer as far as possible the questions that are pouring in from individual members of the industry everywhere, including not only the United States but also the most remote parts of the world. Fully 2,500 of these letters have been received annually for several years.

"We have had hundreds of letters of thanks in reply, but here is just one that is rather typical and makes us feel that maybe we are doing something of real service to the industry. It is from the Rumford Press, of Concord, N. H.:

"May we express to you our hearty appreciation for the hospitality which was extended by you and your associates on the occasion of our recent pilgrimage to the Government Printing Office.

"We were greatly impressed with some of the equipment and processes which we had the opportunity to examine, but we were even more pleased with the splendid spirit manifested by the several department heads who had us in charge during the tour of inspection which we were privileged to make.

BRITISH PRINTERS TO TAKE UP RESEARCH

"It is highly gratifying also to observe that the research work of the Government Printing Office is attracting the attention of graphic art organizations in other countries. In England the master printers have become so interested in the subject as to gather at historic Stationers' Hall in London, under the patronage of the Worshipful Company of Stationers, and listen to a very able lecture on the application of science to printing by Mr. George L. Riddell, the accomplished son of the principal of the London School of Printing. Mr. Riddell discussed the subject in a masterly manner and received a hearty vote of thanks for his splendid presentation of the scientific side of printing, a revelation to many of the master printers of Great Britain. I want to express my sincere appreciation of the extended and complimentary references which Mr. Riddell made to the research work of the Government Printing Office.

"For your understanding of Mr. Riddell's viewpoint of the application of science to printing, I quote the few following thoughts from his address to the British printers:

"There is more scope for usefully applied science in the printing industry than in the majority of other industries already employing such a scheme.

"The craft of printing has been built up largely by rule of thumb methods.
* * * Empirical methods are not sound under modern conditions.

"Those who supply the printer with his raw materials—the paper maker, ink maker, and type-metal manufacturer—are all rapidly introducing scientific control with their businesses, and for this reason alone it would be advisable for the printer to meet them equipped with the necessary scientific knowledge to understand what is being done for him. It is only in this way that the printer will be able to demand the best materials and to make sure that he gets them.

"Those best able to judge recognize that there is a new era commencing in the ever-expanding craft of the printer and that science must play an important part in the development of our industry.

"As a result of the activities on behalf of research work by the two Riddells, father and son, representatives of the printing and related trades of Great Britain held another meeting in London soon after the recent lecture by the younger Riddell and authorized the appointment of a committee to consider the desirability and the feasibility of instituting a technical research bureau for the pooling of technical information and to conduct scientific investigation of technical problems.

INTERNATIONAL CONGRESS OF MASTER PRINTERS

"At the Third International Congress of Master Printers, which I had the honor and privilege of attending in London last April as your representative, together with President Smith, international standardization and simplification was the principal subject of discussion by that notable gathering of several hundred master printers from a score of countries.

"At the London congress there was organized an international bureau which can be of great service to the master printers of the world even if, for the present, it is devoted entirely to research work. The Typothetæ of America ought not to forego the opportunity to join in this great international effort to pool technical knowledge which printers throughout the world may acquire and impart for the benefit of themselves and their fellow printers in other countries.

ALL COUNTRIES COULD AID IN RESEARCH

"Technical research is an undertaking to which all countries could make worth-while contributions from their varied experiences. I am sure the results would be of the utmost value to the printers of every nation and would materially help to insure the peace and prosperity of the world through further advancement of the art preservative, upon which has been and always will be based the progress and security of civilization.

"The representatives of the American Typothetæ at the London congress made no formal commitment in regard to supporting the international bureau. Personally, I am strongly in favor of international cooperative and research work, and as Public Printer will gladly pledge the Government Printing Office to aid in such an undertaking for the benefit of the printing industry. In fact, the Government Printing Office has established contacts for printing research work in other countries which have been of mutual benefit and demonstrated the value of such cooperation at home and abroad.

GERMAN ASSOCIATION TO OPERATE BUREAU

"In accord with an agreement at the London congress, the international bureau will probably be moved from London to Berlin about January 1, to be operated there under the auspices of the Master Printers' Association of Germany. I have just received a letter from

Doctor Woelck, the general director of the German association, stating that if the international bureau is moved to Berlin, the German association hopes that in this work it may have very close and cordial relations with the United Typothetæ of America.

"In concluding, permit me to suggest that the United Typothetæ of America give consideration at this time to the adoption of a definite program for active participation in technical research and the standardization of printing materials. Although the printing industry is one of the largest in America, ranking fourth in value added to raw materials by manufacture, it is one of the most backward in research work and the development of standard specifications.

"For its raw materials, such as paper, inks, type metals, and the like, the printing, publishing, and related industries pay to other industries approximately \$750,000,000 annually. With this immense purchasing power, a united printing industry could successfully support its right to prepare and maintain standard specifications for the materials that are essential in the production of printing.

"It is up to the United Typothetæ of America, therefore, to decide whether the master printer shall have something to say about the materials for his use or whether the paper maker, the ink maker, and other minor interests shall continue so to dominate 'the art preservative of all the arts.'

"If the Government Printing Office can be of service in this regard or is able to help the printing industry in any other way, it awaits your pleasure, and for the cordial cooperation that has brought the Typothetæ into such friendly relations with the Government Printing Office during recent years you have our utmost and everlasting thanks."

RESOLUTION OF THE TYPOTHETÆ CONVENTION

After the address of the Public Printer, the following resolution was unanimously adopted by the convention of the United Typothetæ of America:

Whereas, the address of Hon. George H. Carter before this forty-third annual convention was illuminating in its presentation of the benefits to the printing industry to be derived through laboratory investigation and research; and

Whereas the Carnegie Institute of Technology and the American Society of Mechanical Engineers have given assurance of their deep interest in the technical and mechanical problems of the printing industry and their desire to cooperate in the endeavor to arrive at a solution of these problems; and

Whereas there will be held under the auspices of the Carnegie Institute of Technology at Pittsburgh, November 8 and 9, a special conference to consider matters of interest in connection with printing: Therefore be it

Resolved, That the membership of the United Typothetæ of America welcome this cooperation by the Carnegie Institute of Technology, the American Society of Mechanical Engineers, and the Government Printing Office and gives assurance of its sympathetic interest in any project that may grow out of the November conference in Pittsburgh; be it further

Resolved, That the board of directors is requested to consider the advisability of adding to its program of activities a bureau or department to function along the lines here suggested.

WORLD CONFERENCE ON PRINTING RESEARCH

A world conference of printing industries to discuss the need for research and what is being accomplished in printing was held at the Carnegie Institute of Technology in Pittsburgh, November 7 and 8, 1929, under the auspices of the research and survey committee of the printing industries division of the American Society of Mechanical Engineers.

The conference was attended by more than 200 engineers and technical experts in the printing and related industries of several countries, including the United States, Great Britain, Canada, Germany, and Australia. Favorable responses were also received from other countries, including Japan and the Union of Socialist Soviet Republics, whose representatives were unable to be present.

The 27 organizations participating in this notable conference were listed as follows:

- American Society of Mechanical Engineers.
- United Typothetæ of America.
- New York Employing Printers Association.
- International Association of Printing House Craftsmen.
- Club of Printing House Craftsmen of New York.
- Employing Bookbinders of America.
- American Photo-Engravers Association.
- Photo-Engravers Board of Trade of New York.
- International Association of Electrotypers.
- Lithographers National Association.
- Lithographic Technical Foundation.
- National Association of Printing Ink Makers.
- Technical Association of the Paper and Pulp Industry.
- American Newspaper Publishers Association.
- National Publishers Association.
- National Association of Book Publishers.
- Publishers Association of New York.
- Associated Business Papers.
- American Association of Advertising Agencies.
- Association of National Advertisers.
- International Printing Supply Salesmen's Guild.
- International Trade Composition Association.
- International Printing Pressmen and Assistants Union.
- American Management Association.
- American Institute of Graphic Arts.
- Society for the Promotion of Engineering Education.
- College of Industries, Carnegie Institute of Technology.

PUBLIC PRINTER ADDRESSES RESEARCH CONFERENCE

In recognition of the pioneer research work undertaken by the Government Printing Office for the graphic arts, the Public Printer was invited to give "the keynote speech," according to the program, on *The Necessity for Research in the Printing Industry*. After in-

troductioin by the chairman, Mr. Arthur C. Jewett, director of the College of Industries, Carnegie Institute of Technology, the Public Printer said in his address to the conference:

"On behalf of the United States Government Printing Office, permit me to express our sincere appreciation of your invitation to participate in this world conference of the printing industries. The printing industries division of the American Society of Mechanical Engineers has rendered a fine service in calling such a notable conference under the auspices of its research and survey committee. And there could be no more appropriate place to meet than at the Carnegie Institute of Technology.

"With such distinguished sponsors and accomplished hosts, we are glad to gather here to-day, and for everyone present I am pleased to express our sincere thanks to all those who have made this meeting possible, especially to our able presiding officer, Mr. Jewett, the director of the College of Industries.

"According to the printed program I am scheduled to make a so-called 'keynote speech' on this important occasion. Never before have I been charged with such a responsibility, and it is with much hesitation that I shall address you, realizing I am but a mere printer by trade in the midst of learned masters of the sciences and eloquent exponents of the art preservative.

"Perhaps the program committee thought that, being a Government official, I am therefore a politician and as such should be versed in the art of keynoting. But I wish to assure you at the outset that the Public Printer of the United States is not a politician and that his official duty is to print speeches, not to make them.

"At any rate, I must disclaim any intention of sounding the 'keynote' for this conference, which is amply able to compose its own theme song. My talk to-day should more appropriately be called a 'keyhole' view instead of a 'keynote' speech, for in my opinion the printing industry is just beginning to peep into the problem of scientific research. So I shall present my observations from this point of view, and hope you will be charitable enough to accept them as prompted by a keyhole vision of the subject rather than as an ambition on my part to make a keynote speech to such a distinguished audience.

REAL KEYNOTE SOUNDED BY PRESIDENT HOOVER

"The real keynote for this conference was sounded by President Hoover, in his recent address at Dearborn, paying tribute to Mr. Edison and his inventions. Our great engineer President declared they 'gave an outstanding illustration of the value of the modern method and system of invention, by which highly equipped, definitely organized laboratory research transforms the raw material of scientific knowledge into new tools for the hand of man.'

"Again in the same address the President asserted 'It is organized research that gives daily improvement in machines and processes,' and he also emphasized that 'both scientific discovery and its practical application are the products of long and arduous research.'

"These statements of President Hoover are, I believe, conclusive as to the value to industry of organized research and its benefit to

civilization, for he speaks with intimate knowledge of the subject. Thus accepting the expert judgment of the President as to the value of organized laboratory research by other industries, let us now consider the necessity of similar research by the printing industry.

NECESSITY OF RESEARCH IS SELF-EVIDENT

"As a matter of fact, the necessity of research is so self-evident and so well understood by everyone here that there is little need for me to argue that proposition with this conference. We have only to observe the success of other great industries, like the automotive, chemical, electrical, and metal groups, to appreciate the wonderful accomplishments of scientific research and to realize the great benefits that would come to the printing industry by adopting similar progressive methods. As President Hoover so well said at Dearborn, 'Research both in pure science and in its application to the arts is one of the most potent impulses to progress.'

"We have long boasted that printing is 'the mother of progress,' but if that relationship is to be determined by the impulses of research, which President Hoover asserts are most potent to progress, our industry is not living up to its maternity slogan, nor is it keeping pace with other great industries in the successful application of science.

VAST SUMS SPENT FOR RESEARCH WORK

"In marked contrast with the meager and unorganized support that has been given to research by the printing industry, I invite your attention to a statement by the National Industrial Conference Board that the industrial corporations and the Government of the United States are spending about \$200,000,000 annually for industrial research. It was likewise reported that more than 1,000 companies are now operating research laboratories. In addition, 70 trade organizations are spending \$15,000,000 annually for research work, and more than 150 colleges and technical schools are applying science to help solve industrial problems at a cost of about \$1,500,000 a year. Commending the constructive activity of the trade associations that are engaged in cooperative industrial research, the United States Chamber of Commerce sponsors the statement that the savings of American industry from research amount to one-half billion dollars annually.

"I do not assume to vouch for these immense figures of research expenditures and savings, but even if they were only partially correct, the accomplishments are marvelous and should awaken in us an ardent desire to keep pace with the amazing progress that other industries are making in organized scientific research.

IMPORTANCE OF THE PRINTING INDUSTRY

"The vast importance and power of the printing industry makes its adoption of a definite research program all the more essential. According to the latest census reports it ranks with the foremost groups of American manufactures. In value added by manufacture, which is the most important item of all, the printing and related

industries stand fourth among all the major industries of the United States, having added a total of \$2,808,457,000 to the value of materials used in the year 1927. This immense sum was a close third to the manufacture of food and kindred products, which in the same year was exceeded only by the manufacture of textiles and machinery. In total value of products and cost of materials, the printing and related industries rank seventh among all the major industries of the United States; in amount of wages paid, fifth; and in number of wage earners, sixth.

"It is evident, therefore, that vast interests are at stake in the future progress of the printing industry, which, in my opinion, depends largely upon proper consideration of the problems that only organized research can solve.

COORDINATED ACTION IS NOW NEEDED

"Considerable research work has been done from time to time by various individual establishments in the printing industry, by its principal organizations, by the American Society of Mechanical Engineers, and by commercial, college, and Government laboratories, but the undertaking has lacked the coordination that is essential to success. There must be an exchange of experiences of all these investigations to crystallize their findings into definite form for coordinated action, which alone can insure progress.

"It is most timely, therefore, that this conference has been called and most encouraging that leaders of the printing and related industries have gathered here from various parts of the world to discuss the greatest problem that has ever been presented to the industry. I earnestly hope there may come from this conference a united determination to carry on the work proposed by the committee and that your efforts will meet with everlasting success. In this enterprise I can assure you the full and hearty cooperation of the Government Printing Office.

ELIMINATION OF WASTE IN INDUSTRY

"Elimination of waste has been the principal purpose of some engineers in proposing the research method of reducing the losses of various industries. The printing and publishing industries were declared to be among the most wasteful of all, according to the report published several years ago by a committee of the Federated American Engineering Societies that included printing in its investigation of six selected industries. Preventable wastes observed in the selected industries were reported to range from 29 to 64 per cent, and printing stood next to the head of the list with an average waste of 58 per cent.

"For some reason or other the printing industry has paid little attention to this accusation of gross inefficiency, although the charge was broadcast in book form by the engineering societies eight years ago and later repeated in a Government publication.

"In the meantime the printing industry has continued to progress and to prosper until census statistics show that it ranks near the top of all the industries in the United States. According to the

1929 Commerce Yearbook, the value added to materials used by the printing and related industries in 1927, the latest report, was 11 per cent more than in 1925, an increase which the yearbook stated was 'more marked than in most other census industry groups.'

REPORT WAS BASED ON A HASTY SURVEY

"Therefore, the printing business does not appear to be in as bad a condition as the report on waste in industry might indicate. I must confess, however, that on first reading of the report I was greatly alarmed and felt that, by taking on the job of Public Printer and associating with such a wasteful industry, I had fallen in with derelicts and incompetents who were headed for eternal ruination.

"However, my confidence was restored somewhat when a more careful study of the report revealed that it was based on a hasty survey of only 6 or 7 out of more than 34,000 printing plants in the United States and that additional information was furnished by only 19 other plants. I am happy that the Government Printing Office was not among the few plants whose records were used to indict the entire printing industry for gross wastefulness.

"There is one other statement in the report on waste in industry which it seems timely to call to your attention, and that is the amazing conclusion of the individual engineer who made the printing survey. He boldly predicts that, if his recommendations are adopted, 'the cost of printing to the ultimate consumer could be reduced on an average at least one-third.' That is very encouraging to the ultimate consumer. But what about the printer and publisher who are faced with constantly increasing wages, shorter hours of labor, and the multiplicity of taxes, rents, insurance, and other charges over which they have no control? All of these essential charges not only add to the cost of the printer's own products but also to the price he has to pay for his materials and machines.

LITTLE PROSPECT TO REDUCE PRINTING COST

"In my humble opinion it will require the combined ingenuity of efficiency engineers and practical printers to avoid increases in the future cost of printing. With the higher standards of living and the more general enjoyment of things that few could afford in former years, there is little prospect for reduction in the cost of printing during our lifetime.

"If it is true that preventable wastes in the printing industry amount to 58 per cent, as our engineer critic estimates, we are guilty of throwing away about \$1,600,000,000 every year, based on the census valuation of printed products at \$2,846,000,000 for the year 1927. The suggested reduction of one-third in the cost to the ultimate consumer might benefit him to the extent of about \$950,000,000 annually, which would still leave the printer a margin of at least \$600,000,000, if the preventable waste could be eliminated.

"It is claimed that this miracle can be performed by standardization and simplification alone. The authority for that statement is none other than the United States Bureau of Standards, which, in a printed report on waste in industry, discloses that—I quote the exact

words—‘\$10,000,000,000 could be saved annually through standardization and simplification alone,’ if adopted by the six industries, including printing, which the committee of the engineering societies declared so wasteful.

“That challenge is sufficient cause for this conference to meet and discuss the status of the printing industry and the necessity for research to remedy our wasteful ways. But let us pause for the moment to consider some of the evidence upon which the printing industry has been found guilty of wasting more than a billion dollars annually.

SAVING BY STANDARDIZED BANK CHECKS

“For instance, it has been charged that there is gross waste in the printing of thousands of varieties of bank checks and that \$20,000,000 a year will be saved by the adoption of standard checks. It is asserted that this reform has already been accomplished and that thousands of varieties of bank checks, notes, and so forth, have been reduced to a single standard size.

“‘To-day,’ says a foremost advocate of simplified practice, ‘more than 85 per cent of all checks used are simplified checks.’ However, the thousands of checks constantly coming to the Government Printing Office from all parts of the country do not sustain the optimistic statement I have just quoted.’ As a test I examined 270 checks received in our office one day last week and found 71 different sizes.

“The same authority for the standardization of bank checks also states ‘printers have estimated that simplification has reduced the cost of checks by \$2.50 per thousand.’ In my opinion, the printers who made this estimate were ‘spoofing’ the simplified-practice chief.

“The total cost of printing bank checks on safety paper in lots of 5,000 will not average \$2.50 per thousand, so it would be somewhat difficult to save that amount on each thousand checks. In fact, Government Printing Office figures show that the printing of bank checks on safety paper in sheets of five or more, the usual practice, costs under \$2.50 for the first thousand checks. The added thousand rate is much less.

“It would require a new method of cost accounting to figure out a \$20,000,000 saving on this basis. I am inclined, therefore, to believe that at least this \$20,000,000 will have to be deducted from the anticipated savings through standardization and simplification alone.

STANDARDIZATION FOR THE NEWSPAPERS

“Another interesting item in the report on waste in the printing industry is the proposal for the standardization of newspapers to one size, which, it is asserted, ‘would make possible an annual saving of three to five million dollars on composition and plates alone.’ It is difficult to understand how such a saving on composition and plates alone could be made unless there is a corresponding reduction in the amount of news matter and advertisements that would be printed in a standard-sized newspaper. Perhaps a newspaper that now exceeds the standard size would turn over its surplus news and advertisements to a less fortunate competitor and thus maintain a

happy average. Otherwise, the result would necessarily be more pages of the standard size and consequently no saving in composition and plates.

"But even this standardization could not be brought about until all odd-sized equipment had been junked and replaced at a cost of many million dollars in excess of the estimated saving through adoption of the one-size newspaper.

NEWSPAPERS MOVING IN RIGHT DIRECTION

"In this connection it is pleasing to note that the newspapers themselves are working out a practical solution of their mechanical problems, as shown by the annual survey which has just been published by the Editor and Publisher, of New York. 'Statistics on machine equipment in composing and press rooms show,' says that publication, 'a noticeable tendency toward standardization, in that machines of a single make are replacing equipment produced in half a dozen factories and of various ages and productive ability.'

"It is evident, therefore, that the newspapers are moving in the right direction of their own accord and will eventually settle the question of standard equipment to meet their own requirements and the desire to render better service to their readers and advertisers.

"The plan to eliminate waste in the printing industry also provides that book and job printing shall be of standard form, restricted to standard sizes of paper, and limited to a comparatively few standard faces of type. In other words, it is proposed to take the art out of printing and make it a mere mechanical product, utterly devoid of the artistry and beauty for which the art preservative of all the arts has long been admired.

PRINTING IS NOT LIKE PAVING BRICKS

"In this urge for standardization, printing should not and can not be placed with paving bricks and plumbing supplies. Just as the painter or sculptor must have freedom to express his art with brush or chisel, so should the printer be permitted to manifest his art with type and paper.

"Even in this machine-minded Nation, let us not forget the great debt that civilization owes to printing, nor do anything to mar its beauty and charm for future generations.

"Above everything else, printing in all its branches is an art and should not be standardized for production on an assembling line like a modern automobile. Even Mr. Ford has come to recognize that there must be art in the making of a motor car, and has yielded to the popular demand for variety in design. So, too, must the printer be permitted to progress with the increasing culture of an advancing civilization.

"Although recognizing the need to eliminate waste and effect economies in the printing industry, I do not believe that the art of printing has added materially to the preventable waste in industry. Printers and newspaper publishers are constantly endeavoring to simplify their practices and conform to acceptable standards, and they should be allowed to continue doing so in fond regard for the art which they alone are capable of interpreting.

NO OPPOSITION TO SENSIBLE STANDARDS

"Please do not interpret these remarks as opposing a practical or sensible standardization in printing. In line with the progress that printers have made in standardization of their own accord, I invite your attention to the action of the Government Printing Office in reducing its publications from more than 50 to 8 standard sizes. Three-fourths of the 100,000,000 books and pamphlets issued annually by the Government are now either octavo or quarto in size. Perhaps that is the reason they are read so little.

"The envelopes used by the Government have been reduced from about a dozen to only four standard sizes.

"Government letterheads and blank forms are of one size, 8 by 10½ inches, cut without waste from the old standard double demy sheet of 21 by 32 inches. By adopting this size of letterhead instead of the commercial standard of 8½ by 11 inches, the Government has been saving approximately \$50,000 annually for the last six years, which goes to show that there is economy sometimes in letting the printer set his own standards.

STANDARDIZATION OF MATERIALS REAL NEED

"This leads me to suggest what I believe is the real necessity at this time for scientific research in the printing industry; that is, the standardization of materials required in printing, whether it is wasteful or useful, varied or uniform. In such standardization, organized scientific research can be of the greatest service to the printing industry, which spends annually more than three-quarters of a billion dollars for its materials.

"The printing industry has already made splendid progress in the field of mechanical engineering, as shown by the marvelous development of typesetting machines, printing presses, and other equipment that make possible the speed and economies of present-day production. But in the field of chemical engineering, which has to do with the vast quantity of materials used in printing, the industry is just beginning to find a new and even greater opportunity for advancement.

"To improve its own condition and keep pace with other industries, printing must avail itself more and more of the chemical engineer, for, in the words of the financial editor of the *New York Commercial*, 'there is no business to-day whose welfare and interests are not bound up with chemistry.' The same writer further asserts that 'there is no industry—not one—that is not in danger of waking up to-morrow and finding that the chemist has made a discovery that might revolutionize it,' and he warns, 'no industry which does not command the services of chemists and the resources of a laboratory can be regarded as secure.'

A DEFINITION OF LABORATORY RESEARCH

"Definitely organized laboratory research, which President Hoover pointed out in his Dearborn tribute to Edison as the way to success, has been held by another authority to be 'nothing more nor less than an intelligent inquiry into how to do practical things; if they are

new, how they can be done in the best way; if they are old, how in a better way.' The intelligent inquiry will have to be made by capable engineers.

"Printing materials and processes present more problems that chemical engineers can solve than are offered by almost any other industry. The extent of this field for research is apparent from the fact that the cost of printing materials constitutes more than a fourth of the entire value of printing products. All the materials of the printing industry, such as paper, inks, rollers, type and plate metals, adhesives, platemarking solutions, oils, detergents, and bindery textiles, must be subjected to the microscopic, chemical, and physical tests of the laboratory to determine their quality and suitability for satisfactory service.

"Likewise, the materials used in the construction of printing machinery are within the scope of scientific research to develop even better equipment than that which has brought the printing industry to its present high standard of efficiency.

BENEFIT OF SCIENTIFIC INVESTIGATIONS

"The logical outcome of such scientific investigations by chemical and mechanical engineers would be the development of better standards for printing materials and machinery—standards that will improve the quality of printing products, curtail the waste, and assure greater success for the industry.

"The standardization of materials will also insure fairer competition among the printers, simplify problems of stock and production, and prove more satisfactory to their customers. Furthermore, the manufacture of standardized printing materials would effect a large saving in which the printers are entitled to share.

SCIENTIFIC TESTING OF MATERIALS

"However, the adoption of standards alone will not be sufficient to secure these benefits. There will have to be an accurate and scientific testing of the materials and equipment from time to time to insure compliance with the specifications. It has been the experience of the Government Printing Office that even the most trustworthy contractors will make mistakes and that assurances of quality are sometimes no more reliable than the labels of a patent-medicine bottle. The 'proof of the pudding is in the eating'; the proof of the quality of printing materials can only be determined by testing.

"Frequent testing will also be of great service in the development of new and better specifications, for no standards can be set up as a finality. If the printing industry is to receive the full benefits of research, there must be a constant effort to improve the specifications for its materials.

"For the testing of materials it will be necessary to maintain or employ competent laboratories which can also carry on research work for the industry. The larger printing plants and newspapers may find it more serviceable to establish their own laboratories, as the

Government Printing Office has done. Laboratories are also necessary in the larger manufacturing plants to maintain proper technical control of materials and whatever processes require scientific regulation.

GOVERNMENT PRINTING OFFICE LABORATORY

"The research laboratory of the Government Printing Office, in addition to developing specifications for printing materials and maintaining the prescribed standards by scientific tests, also exercises technical control over its own products, such as inks, press rollers, type metals, plating solutions, detergents, and bindery adhesives.

"The Government Printing Office laboratory was established in 1923 with a staff of six employees, but the work has so broadened and increased that it has now become a major activity, designated as the division of tests and technical control, with more than a score of employees and an annual expenditure of about \$40,000.

"With the completion next year of a large addition to our main building, nearly an entire floor of that structure will be occupied by the technical division, which will undoubtedly then have the best equipped and most modern laboratory in the world devoted exclusively to printing research work. Furthermore, the entire Government Printing Office is available as a laboratory which can and should be of practical service to the printing and related industries.

"It is my opinion that the printing industries are as much entitled to help from the Government Printing Office in the solution of their problems as the agricultural, labor, banking, and various commercial interests are to the assistance they have received for years from other establishments of the Government.

WORK OF THE RESEARCH LABORATORY

"Perhaps I can better present the advantages of scientific research by pointing out a few of the benefits that the Government Printing Office has received from the work of its technical division. At first the laboratory devoted its time mostly to the testing of paper to determine compliance with the standard specifications. This work of itself is no small task, involving the testing of approximately 5,000 samples annually to determine the quality of the yearly purchase of 45,000,000 pounds of all grades of paper. The experience has been of great value in the development of definite grades and standards of paper for general as well as Government use.

"Aside from its routine testing work, the laboratory has undertaken a number of important investigations of printing materials and processes. One of the most important was the standardization of 6,600,000 pounds of linotype, monotype, stereotype, and electrotypes alloys, which resulted in a saving of approximately \$400,000. The old metal contained an excessive amount of tin due to previous 'rule-of-thumb' corrections. Standardization added to our supply of type-metal alloys 1,099,000 pounds of corrected metal at practically the cost of lead, thereby effecting a further saving of \$35,000.

"And even greater benefit from the standardization of type-metal alloys is in the reduced expense of operating type-casting machines, the elimination of difficulty in molding processes, and the better quality of presswork.

SAVINGS IN CLEANING COMPOUNDS

"The laboratory has been of another good service in disclosing for our own information the ordinary ingredients used in certain commercial compounds extensively used as solvents. For instance, the sample of an ink solvent with a well-known name was found to consist almost entirely of kerosene colored with a little pine-tar oil.

"Several other cleaning compounds selling for 12 to 15 cents a pound showed on analysis that they were composed largely of trisodium phosphate, which can be bought in quantities for 4 to 5 cents a pound. This investigation enabled the laboratory to prepare better formulæ for cleaning mixtures, which the Government Printing Office is now using, at a saving of about \$10,000 a year. The Postal Service has also adopted the same formulæ for the cleaning of automobile parts at post offices throughout the country.

"Another interesting contribution of the laboratory is the utilization of old press-roller composition to make glue for bindery adhesives. The old rollers were formerly sold as waste material for about 1½ cents a pound, while 15 cents a pound had been paid for bindery glue. The utilization of this waste material is saving the office about \$3,000 a year.

COOPERATION WITH THE TYPOTHETÆ

"Our first cooperative research work was with the United Typothetæ of America, which in 1924 accepted an offer of the Public Printer to assist in establishing standard grades of bond and ledger papers. An expert employed by the Typothetæ aided in preparing the preliminary report. Another report was published by the Government Printing Office in 1928, but no action on it has been taken by the Typothetæ. However, the grades proposed for bond and ledger papers have been adopted by the Government and used satisfactorily for several years.

"Believing that cooperative research work with the printing and related industries would be helpful both to the Government and to the industries in the development of uniform specifications and standards of printing materials, a recommendation was submitted to Congress that the Government Printing Office be formally authorized by law to engage in such work.

"This was done by the act of May 14, 1928, which specifically included the Government Printing Office in the list of industrial and scientific establishments of the Government that are authorized by law to offer their facilities to scientific investigators and qualified individuals for study, research, and the promotion of knowledge. Accordingly, the Government Printing Office now has the same legal right to cooperative scientific investigations as has any other establishment of the Government.

OTHER COUNTRIES TO BEGIN RESEARCH WORK

"In view of the research work started by the Government Printing Office, it is very gratifying to note that graphic art organizations and master printers in other countries are also beginning to propose the application of science to research by the printing industry.

"At the Third International Congress of Master Printers, which I had the privilege of attending in London last April as a representative of the United Typothetæ of America, research was a principal subject of discussion by that notable gathering of several hundred master printers from a score of countries.

"In urging the London congress to organize an international bureau as a clearing house of technical information, Mr. W. Howard Hazell, a distinguished English printer, declared 'the time is ripe for a complete and careful national and international investigation into all our means of production and the methods of dealing with materials in order to discover what improvements can be made.'

"The international bureau for master printers was favored also by a noted French printer, M. Gabriel Delmas, of Bordeaux, who proposed 'a common investigation of all the problems raised by the methodical organization of the profession in the educative, commercial, and technical aspects.'

"Mr. Rudolf Ullstein, the head of the German delegation, suggested that the first and foremost duty of an international bureau would be the circulation of information respecting various interests, including standardization of type, paper, and machinery.

INTERNATIONAL BUREAU IS ESTABLISHED

"The London Congress of Master Printers accordingly agreed to establish an international bureau, which is to have its headquarters in Berlin.

"The Worshipful Company of Stationers, that famous organization of English printers and publishers, whose present master is the Lord Mayor of the city of London, has also given its powerful support to printing research. It recently appointed a committee to consider the desirability and feasibility of instituting a technical research bureau for the pooling of information and to conduct scientific investigation of technical problems.

"This action was inspired by a lecture on the application of science to printing, which Mr. George L. Riddell, the talented son of the principal of the London School of Printing, delivered at a large gathering of English printers several months ago in the London Stationers' Hall. In his address Mr. Riddell commented at considerable length on the research work of the Government Printing Office, citing it as an example for the British printers to study.

"It is therefore especially pleasing for me to welcome here to-day the elder Riddell, who, in addition to being principal of the great London School of Printing, is an honored leader of the British industry, and is also an ardent advocate of scientific research.

"It is likewise a great pleasure to renew at this conference my friendship with Herr Helmberger, of Berlin, the distinguished director of the Reichsdruckerei, the Government Printing Office of

Germany. I have had the privilege of visiting his wonderful establishment and have profited much by the splendid spirit of cooperation which Herr Helmberger and his associates have manifested in discussing our mutual problems as the printers for two great Governments. The Reichsdruckerei has done much excellent research work, which I hope through the exchange of experiences and coordinated action can be made available to the industry.

VIEWPOINT OF PRINTER, NOT AN ENGINEER

"This brings me to the stopping place, as I have exhausted my thoughts and myself as well. Undoubtedly, I have exhausted you also. It has not been my purpose to come before you as an engineer or as an expert in any line of research, but I have endeavored, from the viewpoint of a practical printer, to submit my general observations of the research problems which will be discussed here by others better qualified to present a scientific and technical study of the subjects we are to consider.

"In concluding, I wish to thank you again for the privilege of participating in this notable conference and to assure you that the Government Printing Office stands ready at any time and in any way to cooperate with the printing industry in a program of definitely organized scientific research."

GRAPHIC ARTS RESEARCH FOUNDATION PROPOSED

At the conclusion of the two-day conference in Pittsburgh the delegates from the 27 participating organizations unanimously adopted the following resolutions, pledging support to a Graphic Arts Research Foundation and appointing a ways and means committee to formulate a plan for its establishment:

Whereas the representatives of the Graphic Arts of North America in attendance at this International Conference on Printing Research recognize the important contribution to industrial progress which is being made through technical research, whether it be in the field of transportation or communication, in the manufacture of electrical equipment or chemical supplies, or in other basic industries; and

Whereas the Graphic Arts of North America must encourage and carry on technical research in a comprehensive way in order to cope with present day industrial problems: Therefore, be it

Resolved, that a Graphic Arts Research Foundation be established, which shall be supported and counseled by all graphic arts interests that desire to cooperate.

That chief among the purposes of the Research Foundation will be to—

1. Conduct basic technical research in all phases of the graphic arts.
2. Consider concrete problems of immediate importance to the graphic arts.
3. Outline means of testing inventions and of inspection or checking results of manufacture or purchase for the benefit of the graphic arts.
4. Cooperate with other Graphic Arts Research agencies to avoid duplication, except as requested for confirmation and checking purposes.
5. Record and index properly all research work in process, all research data available, and other pertinent information.

6. Publish results of all general research activities and special studies.

7. Initiate desirable research projects, including the economics of the industry: And be it

Further resolved, That a ways and means committee be appointed by the chairman to formulate a plan to establish and maintain this research foundation; and be it

Further resolved, That the representatives of the Graphic Arts interests in attendance at this International Conference on Printing Research hereby pledge themselves to advocate and promote the active participation of their respective interests toward the consummation of this plan for a Graphic Arts Research Foundation.

CAFETERIA AND RECREATION ASSOCIATION

The president of the Government Printing Office Cafeteria and Recreation Association, a voluntary organization of employees having in charge the activities indicated by its name, reports unusual success in all of the association's undertakings during the past year. The total receipts for the year ended October 14, 1929, amounted to \$232,212.67, an increase of \$10,446.45, and the largest receipts for any year since the cafeteria was established in 1922.

During the year, 814,895 orders for food were served, the average daily patronage being 2,612. The maximum patronage for one day was on November 2, 1928, with a total of 3,667 out of 3,825 employees working at that time.

Quite a number of employees eat all their meals in the cafeteria, which operates on a 20-hour service when the regular night force is working. The principal lunch period, however, is at noon, but owing to the various shifts meals have to be provided at other times, especially late at night and early in the morning, in order to accommodate employees working at unusual hours.

Employees are allowed 30 minutes for each lunch period, including time of going to and returning from the cafeteria. To provide adequate elevator service for the large number at noon and midnight, lunch periods have been staggered so that groups may go to lunch at intervals of 10 or 15 minutes. The plan has facilitated the lunch service, and the cafeteria, with its seats and tables for 700 persons, is thus able to accommodate the entire force by several lunch periods.

EXPENDITURES OF THE ASSOCIATION

The cafeteria association maintains a staff of 67 employees, all the wages of whom are paid from the receipts of the association which operates on substantially a cost basis. During the year the association expended \$6,119.67 of its own funds for the purchase and replacement of equipment, including a new dishwasher costing \$2,700.

The association also renders financial assistance to the recreational and entertainment activities which it sponsors on behalf of employees,

such as the baseball and bowling teams, the annual Christmas entertainment for the children of employees, the day and night orchestras, and the annual excursion to a near-by summer resort. More than 2,000 children attend the Christmas entertainments in Harding Hall, and fully 1,800 employees and their families enjoyed the annual outing to Chapel Point on July 24, 1929.

The baseball teams are practically self-sustaining through the proceeds of entertainments in Harding Hall during the winter months. Last year the white and colored baseball teams won second places in the three Government leagues and now treasure in the office trophy case sixteen first and second place cups won during the last seven years.

Receipts from the four bowling alleys in the office more than pay the expenses of operation and upkeep. Last year, 65,567 games were rolled on the office alleys, which are used by the night employees during the day and the day employees during the evening.

ENTERTAINMENTS IN HARDING HALL

Owing to the reconstruction of Harding Hall there have been no assemblies or entertainments for employees since that work began in June, 1929. As soon as the new hall is available it is planned to resume its use for the benefit of employees.

Formal assemblies are usually held on the days preceding certain legal holidays, as the Fourth of July, Thanksgiving, and Memorial Day; and also on Armistice Day. For those occasions prominent speakers are invited to address the audiences in Harding Hall, and an excellent program of music is provided by the office orchestra and other talent of note. The Memorial Day speaker on May 29, 1929, was Hon. Roy G. Fitzgerald, of Ohio, chairman of the House Committee on Revision of the Laws.

Besides generously contributing to the aid of their fellow employees through numerous relief associations and special benefit funds, the employees of the Government Printing Office are always liberal in their response to the annual Red Cross roll call and the annual "buddy-poppy" sale by the Veterans of Foreign Wars.

ANNUAL CONTRIBUTIONS TO THE RED CROSS

The Red Cross subscription for 1930 amounted to \$1,527.90, which was exceeded in the Government service only by the Treasury Department. That department, including the Bureau of Engraving and Printing, has 13,720 employees in Washington, while the Government Printing Office has only 4,400 on its rolls.

In recognition of this splendid service the roll-call director of the District of Columbia Chapter of the American Red Cross, Mrs.

Harry C. Barnes, addressed the following letter, dated November 27, 1929, to the chief clerk, Mr. H. H. Wright, who has charge of the Red Cross enrollment in the Government Printing Office:

We are very glad to welcome the employees of the Government Printing Office who enrolled as members of the District of Columbia Chapter, American Red Cross, for the year 1930, and take pleasure in acknowledging receipt of their membership dues amounting to \$1,527.90. This enrollment, we are pleased to report, exceeds that of last year by an increase of \$25.65.

Permit me to express to the personnel of the Government Printing Office our deep appreciation for their very generous enrollment. More and more our chapter looks to the Government departments for increased strength and support in its important work, and each year we note the growth of these memberships.

It is a genuine pleasure to receive the whole-hearted response from the Government Printing Office, and on behalf of the chapter I desire to extend our many thanks to each member who enrolled. May I also thank you most cordially for the time and service you have personally given to the cause of the roll call, as well as those who assisted in the work of soliciting.

"BUDDY POPPY" SALE SUPPORTED BY EMPLOYEES

The following letter, in regard to the success of the "buddy poppy" sale, was received by the Public Printer from the commander of the National Capital Post No. 127, Veterans of Foreign Wars, Mr. O. W. Hollingsworth:

Receipt is acknowledged of a check through the Government Printing Office Cafeteria and Recreation Association in the amount of \$144.44, the proceeds from the sale of the "buddy poppy" in the Government Printing Office during the "buddy poppy" campaign of May 27 to 29, inclusive, 1929.

I assure you, honorable Mr. Carter, that this organization is indeed proud of the cooperation and assistance that you have extended to this most worthy and charitable cause. Therefore, in behalf of National Capital Post No. 127, Veterans of Foreign Wars of the United States, I wish to extend the most sincere and heartfelt thanks and appreciation to you; the Government Printing Office Cafeteria and Recreation Association; Miss Mary A. Tate, assistant to the Public Printer; the Misses Eva Cunningham, Hedwig A. Smolinski, L. Miriam Pyne, K. E. Shipman; Mrs. Mary J. Killian, and Mrs. Vera Flester; and to the entire employment of your bureau in helping make this year's "buddy poppy" campaign an outstanding success.

INCREASE IN THE NUMBER OF EMPLOYEES

According to the report of the chief clerk, the total number of employees on the rolls of the Government Printing Office June 30, 1929, was 4,187, an increase of 137 over the number on June 30, 1928. Owing to unusual requirements for the special session of Congress and the new administration, there has been a further increase in the number of employees, bringing the total on December 31, 1929, up to 4,408, which includes 160 apprentices and 315 employees in the office of the Superintendent of Documents. That is the largest number of employees since November, 1921.

The appointments of employees during the fiscal year 1929 totaled 417 and the separations 280. The labor turnover for the year was about 16 per cent. The largest turnover was among messenger boys and laborers, many of the former being employed only during school vacations.

EMPLOYMENT CONDITIONS SATISFACTORY

Employment in the skilled trades remains quite steady, owing to satisfaction with wages and working conditions. Of printers, there were 116 appointments and 81 separations, the latter including 18 retirements. Pressmen and bookbinders each had 13 appointments and 11 separations. Photo-engraver appointments were 3 and separations 6. There were no changes in the personnel of stereotypers and electrotypers during the fiscal year. Fifty-nine apprentices were appointed, of whom 43 were for training as printers, 8 as bookbinders, 7 as pressmen, and 1 as photo-engraver.

There were 45 deaths among employees during the year ended June 30, 1929, one of which occurred in the office. None was due to injuries received in the service.

The Government does not pay any death benefits, but the employees of the Government Printing Office have a number of voluntary relief associations, which provide benefits of \$250 to \$500. Some of the trade-unions of which employees may be members also pay moderate death benefits.

The estate of a Government Printing Office employee is also entitled to payment for whatever wages and unused leave of absence may be due the employee at the time of death. The largest individual payment in 1929 was \$481.84, and the total for the year was \$8,018.11. In addition, a deceased employee's retirement contributions, with 4 per cent interest, are returnable to his estate.

RETIREMENTS TOTAL 805 FOR NINE YEARS

Retirements during the fiscal year concluded the Government service of 43 employees, 30 of whom retired on account of age and 13 on account of disability. All those retired were entitled to annuities from the Government ranging from \$214.80 to \$1,000 a year, the latter amount being the maximum allowed by law.

Since the retirement law became effective on August 20, 1920, there have been 805 retirements from the Government Printing Office on account of age and disability. During the period up to June 30, 1929, employees of the Government Printing Office have paid into the retirement fund the sum of \$1,717,783.87, which was collected by deducting 3½ per cent (2½ per cent prior to July 1, 1926) from their salaries and wages each pay day. The retirement bureau is unable to advise this office as to the total amount paid to retired

employees of the Government Printing Office, but it is known that 295 of the 805 employees who retired since 1920 were each granted the maximum annuity of \$1,000 a year.

RETIREMENT LAW UNFAIR TO THE TRADES

The present retirement law does not appear to be fair or just to the employees of the Government Printing Office, especially to the skilled trades which constitute the greater part of the force. A skilled tradesman is required to contribute almost double the amount paid by a \$1,500 clerk, who is entitled on retirement to the same annuity.

For example, a printer whose wages are \$1.10 per hour, or \$2,754.40 per year, must pay \$96.40 annually to the retirement fund, while a clerk at \$1,500 contributes only \$52.50 annually, and yet on retirement after 30 years' service each receives an annuity of \$1,000.

Another typical instance of the discrimination against the skilled trades is the specific case of a compositor who has contributed \$620.69 to the retirement fund since 1920, and of a laborer whose contributions have amounted to only \$314.83 for the same period. On retirement, the compositor will receive an annuity of \$1,000, and the laborer, \$750, although the compositor has paid almost double the retirement contributions of the laborer.

It may be argued that as mechanics are retirable at an earlier age—65 years instead of 70 as for other employees—their contributions to the retirement fund are correspondingly reduced; but there is no financial benefit in the earlier retirement age, as everyone must have served at least 30 years to be entitled to the maximum annuity. Furthermore, with two extensions of two years each, the mechanic would be almost the same age on retirement as the clerk who can retire at 70.

MAXIMUM ANNUITY IS INSUFFICIENT

Many employees in the skilled trades have been found capable of good service on extended time, and have asked to be retained, as they could not afford to retire at an earlier age on the present annuity. As a matter of fact, the maximum annuity of \$1,000 is insufficient and ought to be increased to at least \$1,200 a year with an additional amount for those who have made greater contributions to the retirement fund.

Another injustice of the present retirement law is its discrimination against employees who have served more than 15 years before reaching retirement age, and who can therefore be granted only two extensions of two years each. This requires the arbitrary retirement of a skilled employee with more than 15 years' service at the age of

69, while some one else, with no Government experience, could be appointed in his place at the age of 64 and can not be retired, under the 15-year service provision, until he is 79 years of age. Yet the employee who has devoted the better part of his life to the Government service, and who generally would be more experienced and valuable from longer service, must in any event be retired at 69.

The 15-year service provision of the retirement law encourages older persons to seek support on the Government pay roll in their declining years, and at the same time penalizes the younger employee who has given the greater part of his life to the service of the Government. The law should be amended to remove this discrimination and to prevent misuse of Government pay rolls.

LIMITING EXTENSIONS IMPAIRS SERVICE

The Public Printer also recommends repeal of the provision in the present retirement law prohibiting more than two extensions after August 20, 1930, and requiring the retirement at that time of all employees who have served four years beyond their regular retirement age. This arbitrary restriction will end the services of a number of employees whose long experience and special knowledge, together with their physical fitness, are of the greatest value to the Government.

The Government Printing Office now has 150 employees on first and second extensions and 42 others with more than two extensions. Under the present law all of these employees will have to retire in the next few years regardless of the value of their continued service to the Government.

There are at present a number of employees in the Government Printing Office whose retirement would be a serious loss to the public service. A specific case, well known to almost every Member of Congress, is that of William Andrew Smith, who has represented every Public Printer as Congressional Record clerk at the Capitol for more than 51 years. There is no more efficient or capable employee in the entire Government service than Mr. Smith, and the Public Printer would be most happy to retain him in the position where he has rendered such faithful and notable service to Members of Congress in their business relations with this office. However, unless the present retirement limit is removed, Mr. Smith will have to retire on August 20, 1930.

The Public Printer therefore recommends that Congress at this session grant the privilege of further retirement extensions in special cases where the continuance of an employee in this office would be ad-

vantageous to the public service. If deemed advisable, the Public Printer would be glad to submit such cases to the Joint Committee on Printing for its approval.

MEDICAL SERVICE RENDERED EMPLOYEES

As authorized by law, the Government Printing Office maintains an emergency room for the use of all employees who may be taken suddenly ill or receive injury while on duty. During the fiscal year, 14,451 treatments were given to injured and sick employees by the office staff of two physicians assisted by three graduate nurses, who alternate on duty for the day and night forces. Of these treatments, 3,577 were of surgical nature and 6,190 medical, requiring 4,684 treatments.

Employees of the near-by city post office are also treated when its medical aid is absent, and 207 post-office employees availed themselves of the privilege during the year.

The medical and sanitary officer also has full supervision over the sanitation of the entire office and the safeguarding of all machinery. As evidence of his good work in this regard, as well as in the care that has been given to injured employees, it is gratifying to report that only 15 employees required Government compensation because of injuries during the year.

Physical examinations of employees are made on entrance to the service, on application for extension of retirement time, and whenever deemed necessary to determine fitness for duty. These examinations numbered 673 for the year. In addition, the medical staff reviewed 4,433 reports of employees absent for illness or death in family, so as to safeguard the health of their fellow employees and determine fitness for return to duty. A number of cases of quarantine were also investigated and visits made to the homes of employees to ascertain their physical condition. Thirty-six cases were sent to the Public Health Service for hospitalization, X-ray treatment, etc., and eight cases to the Veterans' Bureau for treatment.

HYGIENIC CONDITIONS OF THE OFFICE

In concluding his annual report, the medical and sanitary officer submitted the following statement of health and sanitary conditions in the Government Printing Office during the fiscal year 1929:

Constant vigilance is being maintained as to the hygienic conditions of the plant, and for this purpose tours of inspection are made as regularly as circumstances will permit.

It is very apparent that considerable thought and good judgment has entered into the rearrangement of the mechanical equipment and layout of work in many of the sections. In each of these moves consideration has been given for the safety and comfort of the worker, as well as for a better layout for production.

Splendid cooperation has been given by the superintendents, foremen, and workmen in keeping the plant clean.

Our working conditions are good; our people are happy, healthy, and contented.

Under authority of the act approved February 28, 1929 (Public No. 844, 70th Cong.), the Public Printer has discontinued the printing of such other and additional reports for the fiscal year ended June 30, 1929, as have usually been submitted to Congress concerning the business of the Government Printing Office. The original copies of such reports will be kept on file in the office of the Public Printer for public inspection, as provided for in said act.

Respectfully submitted.

George H. Carter
Public Printer.

DIVISION OF ACCOUNTS
STATISTICAL TABLES

STATISTICAL TABLES

COMPILED BY THE SUPERINTENDENT OF ACCOUNTS AND BUDGET OFFICER

TABLE 1.—Resources and liabilities under appropriations for the fiscal year ended June 30, 1929

RESOURCES			
Appropriation for working capital.....	\$2,500,000.00		
Deficiency act March 4, 1929.....	3,600.00		
Payments from all sources for printing and binding.....	9,308,822.83		
Refunds and receipts from various sources.....	378.73		
Bills receivable July 1, 1929, for printing and binding furnished.....	919,071.09		
		\$12,731,872.65	
Appropriation for salaries for Superintendent of Documents.....	450,000.00		
Deficiency act March 4, 1929.....	26,000.00		
		476,000.00	
Appropriation for general expenses, office of Superintendent of Documents.....		187,000.00	
Total resources available for fiscal year 1929.....			\$13,394,872.65
LIABILITIES			
Working capital and repayments for printing and binding:			
Disbursed to June 30, 1929.....	\$11,154,335.26		
Outstanding obligations July 1, 1929.....	1,199,894.71		
Total disbursed and outstanding obligations.....		12,354,229.97	
Salaries, office of Superintendent of Documents:			
Disbursed to June 30, 1929.....	435,206.28		
Outstanding obligations July 1, 1929.....	18,140.96		
Total disbursed and outstanding obligations.....		453,347.24	
General expenses, Office of Superintendent of Documents:			
Disbursed to June 30, 1929.....	106,806.61		
Outstanding obligations July 1, 1929.....	73,052.47		
Total disbursed and outstanding obligations.....		179,859.08	
Total disbursed to June 30, 1929.....	11,696,348.15		
Total outstanding obligations July 1, 1929.....	1,291,088.14		
Total disbursed and outstanding obligations.....			12,987,436.29
Unobligated balance (subject to 10 per cent over or under on outstanding orders).....			407,436.36
			13,394,872.65

TABLE 2.—Summary of financial transactions in fiscal year ended June 30, 1929, covering appropriations for fiscal years 1927, 1928, and 1929

APPROPRIATION FOR 1927

	Resources	Disbursements	Unexpended balance July 1, 1929
Salaries, office of Public Printer: Unexpended balance July 1, 1928.....	\$9,164.99		\$9,164.99
Public printing and binding:			
Unexpended balance July 1, 1928.....	1,039,472.80		
Disbursed for lithographing and engraving.....		\$10,570.00	
Total.....	1,039,472.80	10,570.00	1,028,902.80
Salaries, office of Superintendent of Documents: Unexpended balance July 1, 1928.....	7,159.91		7,159.91
General expenses, office of Superintendent of Documents:			
Unexpended balance July 1, 1928.....	21,260.29		
Disbursed.....		4,236.18	
Total.....	21,260.29	4,236.18	17,024.11
Grand total appropriation.....	1,077,057.99	14,806.18	1,062,251.81
Unobligated balance of 1927 appropriations on June 30, 1929.....			1,062,251.81

TABLE 2.—Summary of financial transactions in fiscal year ended June 30, 1929, covering appropriations for fiscal years 1927, 1928, and 1929—Continued

APPROPRIATION FOR 1928

	Resources	Disbursements	Unexpended balance July 1, 1929
Public printing and binding:			
Unexpended balance July 1, 1928.....	\$1,003,962.22		
Credits to appropriations by payments from all sources for printing and binding and other receipts from miscellaneous sources.....	709,443.31		
Disbursed for labor.....		\$342,882.14	
Disbursed for paper.....		482,826.37	
Disbursed for lithographing and engraving.....		56,940.80	
Disbursed for material and supplies.....		262,554.69	
Total.....	1,713,405.53	1,135,204.00	\$578,201.53
Salaries, office of Superintendent of Documents:			
Unexpended balance July 1, 1928.....	33,722.33		
Disbursed.....		18,868.33	
Total.....	33,722.33	18,868.33	14,854.00
General expenses, office of Superintendent of Documents:			
Unexpended balance July 1, 1928.....	74,712.50		
Disbursed.....		48,764.02	
Total.....	74,712.50	48,764.02	25,948.48
Grand total appropriation.....	1,821,840.36	1,202,836.35	619,004.01
Deduct for outstanding obligations.....			9,200.00
Unobligated balance of 1928 appropriations on June 30, 1929.....			609,804.01

APPROPRIATION FOR 1929

Public printing and binding:			
Legislative act May 14, 1928.....	\$2,500,000.00		
Deficiency act March 4, 1929.....	3,600.00		
Credits to appropriations by payments from all sources for printing and binding and other receipts from miscellaneous sources.....	9,309,201.56		
Disbursed for labor.....		\$8,024,412.90	
Disbursed for paper.....		2,381,780.73	
Disbursed for lithographing and engraving.....		66,677.56	
Disbursed for material and supplies.....		681,464.07	
Total.....	11,812,801.56	11,154,335.26	\$658,466.30
Salaries, office of Superintendent of Documents:			
Legislative act May 14, 1928.....	450,000.00		
Deficiency act March 4, 1929.....	26,000.00		
Disbursed.....		435,206.28	
Total.....	476,000.00	435,206.28	40,793.72
General expenses, office of Superintendent of Documents:			
Legislative act.....	187,000.00		
Disbursed.....		106,806.61	
Total.....	187,000.00	106,806.61	80,193.39
Grand total appropriation.....	12,475,801.56	11,696,348.15	779,453.41
Bills receivable.....			919,071.09
Deduct for outstanding obligations.....			1,698,524.50
Unobligated balance of 1929 appropriations on June 30, 1929.....			1,291,088.14
Total unobligated balances (subject to change by 10 per cent over or under on outstanding obligations):			407,436.36
1927.....			1,062,251.81
1928.....			609,804.01
1929.....			407,436.36
Total.....			2,079,492.18

TABLE 2.—Summary of financial transactions in fiscal year ended June 30, 1929, covering appropriations for fiscal years 1927, 1928, and 1929—Continued

RECAPITULATION—ALL APPROPRIATIONS	
Total paid for labor.....	\$8,367,295.04
Total paid for material and supplies.....	934,018.76
Total paid for lithographing and engraving.....	134,188.36
Total paid for paper.....	2,864,607.12
Total paid for printing and binding.....	12,300,109.26
Total paid for salaries, office of Superintendent of Documents.....	² 454,074.61
Total paid for general expenses, office of Superintendent of Documents.....	159,806.81
Grand total.....	12,913,990.68
¹ Includes amount paid to retirement fund.....	\$308,717.91
² Includes amount paid to retirement fund.....	16,632.76
Total paid to retirement fund.....	325,350.67

TABLE 3.—Moneys received during fiscal year 1929, the source and Treasury deposit

1925	
Deposited to the credit of appropriation for public printing and binding: Refund.....	\$7. 72
1928	
Deposited to the credit of appropriation for public printing and binding:	
For printing and binding for departments and bureaus.....	\$701,251.33
For miscellaneous printing and binding.....	7,496.91
Refunds.....	690.23
Auditor's disallowance.....	4.84
Total.....	709,443.31
1929	
Deposited to the credit of appropriation for public printing and binding:	
For printing and bind for departments and bureaus.....	9,251,112.03
For miscellaneous printing and binding.....	57,710.80
Refunds.....	375.73
Auditor's disallowance.....	3.00
Total.....	9,309,201.56
Deposited to miscellaneous receipts:	
Sale of waste paper.....	39,455.54
Sale of waste metal.....	4,985.57
Sale of waste wood.....	650.38
Sale of waste gold.....	286.61
Sale of leather scraps.....	10.74
Sale of condemned material.....	1.00
Sale of documents.....	125,000.00
Total.....	170,389.84
Grand total.....	10,189,042.43

TABLE 4.—Production of principal items entering into printing and binding in fiscal years 1927, 1928, and 1929

Item	1927	1928	1929
Main office and Congressional Library branch:			
Total charges for printing and binding..... dollars.....	12,692,314.49	12,370,146.63	¹ 13,515,330.80
Jackets written..... number.....	54,168	58,900	58,860
Estimates made..... do.....	47,452	52,149	54,269
Bills computed..... do.....	72,545	74,489	75,919
Total ems set..... do.....	2,060,248,100	2,101,301,000	2,226,741,000
Time-work in composing sections..... hours.....	242,836	248,765	251,514
Electrotype and stereotype..... square inches.....	11,356,708	10,345,015	10,820,451
Postal cards printed..... number.....	1,950,508,300	1,726,524,392	1,820,181,228
Money-order books shipped..... do.....	1,002,354	1,005,265	1,040,807
Forms sent to press..... do.....	145,831	161,615	153,427
Actual impressions..... do.....	484,678,679	496,693,620	512,438,770
Chargeable impressions..... do.....	1,960,834,989	1,936,225,940	2,225,320,830
Sheets folded..... do.....	373,434,554	378,427,584	378,361,054
Signatures gathered..... do.....	162,461,334	159,165,884	154,190,077
Tips made..... do.....	23,827,484	24,638,033	22,179,086
Copies wire stitched..... do.....	49,370,898	46,989,822	45,017,756
Copies paper covered..... do.....	8,574,395	10,593,833	10,547,504
Books and pamphlets trimmed..... do.....	53,913,955	47,548,337	44,992,890
Books rounded and backed..... do.....	1,160,085	1,357,951	1,308,867
Books marbled and edged..... do.....	163,477	294,394	457,659
Stamping impressions..... do.....	2,736,425	2,861,897	2,743,084
Books cast in..... do.....	1,436,213	1,626,978	1,668,704
Indexes cut..... do.....	140,359	130,011	195,664
Sheets passed through ruling machine..... do.....	22,589,915	22,867,419	26,869,442
Signatures sewed..... do.....	76,210,279	61,087,869	58,600,715
Copies punched and drilled..... do.....	115,356,979	135,559,178	148,993,935
Sheets and lines perforated..... do.....	6,861,125	8,111,287	8,189,708
Tablets made..... do.....	2,889,402	2,928,330	3,573,051
Miscellaneous rebindings, etc..... do.....	102,519	90,221	93,376

¹ Includes \$800,000 estimated labor and material on uncompleted jobs.

TABLE 5.—Charges for work and to whom delivered during the fiscal year ended June 30, 1929

Congress.....	\$2,487,436.88
Work ordered by Members of Congress:	
Miscellaneous charges.....	635.97
Documents, reports, bills, etc.....	12,449.80
Speeches.....	66,490.67
Private orders for electrotypes.....	601.87
Superintendent of Documents.....	642,784.55
State.....	248,482.92
Treasury.....	929,992.81
War.....	677,336.14
Navy.....	675,065.11
Interior.....	214,033.37
Geological Survey.....	114,872.65
Smithsonian Institution.....	126,072.48
Justice.....	224,329.71
Post Office.....	2,113,061.95
Agriculture.....	803,828.88
Commerce.....	796,857.81
Patent Office.....	1,047,902.85
Labor.....	230,201.71
Library of Congress.....	334,502.33
White House.....	3,777.25
Pan American Union.....	35,133.45
Supreme Court:	
District of Columbia.....	3,954.77
United States.....	3,506.54
Court of Claims.....	39,072.89
Interstate Commerce Commission.....	196,998.67
Civil Service Commission.....	56,949.00
Geographic Board.....	715.80
General Accounting Office.....	29,850.57
Alien Property Custodian.....	1,784.50
Bureau of the Budget.....	25,751.51
District of Columbia.....	75,949.31
Employees' Compensation Commission.....	8,435.07
Federal Reserve Board.....	54,543.63
Federal Board for Vocational Education.....	7,949.84
Federal Trade Commission.....	27,301.71
National Advisory Committee for Aeronautics.....	18,493.34
Panama Canal.....	60,064.76
Railroad Administration.....	558.22
Board of Mediation.....	1,530.39
Shipping Board.....	55,727.23
Tariff Commission.....	21,182.11
Veterans' Bureau.....	143,440.31
War Finance Corporation.....	496.39
Public Buildings and Public Parks.....	5,076.37
Arlington Memorial Bridge Commission.....	476.16
American Battle Monuments Commission.....	201.03
Bureau of Efficiency.....	402.19
Commission of Fine Arts.....	400.18
Federal Power Commission.....	6,266.67
National Forest Reservation Commission.....	309.83
National Home for Disabled Volunteer Soldiers.....	552.36
Special counsel, oil leases.....	5.43
Board of Tax Appeals.....	50,133.72
National Capital Park and Planning Commission.....	2,231.23
Inland Waterways Commission.....	609.25
Two Hundredth Anniversary of George Washington's Birthday.....	119.14
Federal Radio Commission.....	8,033.72
Pan American Sanitary Bureau.....	15,148.43
War Claims Arbitrator.....	2,065.95
George Rogers Clark Sesquicentennial Commission.....	71.06
Personnel Classification Board.....	2,502.70
National Commission on Law Observance and Enforcement.....	232.64
National Academy of Sciences.....	385.52
Total.....	12,715,330.80

TABLE 6.—Cost of production for the fiscal year 1929

Division, office, or section	Salaries, wages, leave, and holiday pay	Material and supplies for operation	Maintenance and upkeep	Work by other sections, including proof and apprentice	Expense of delivery of product and storage of plates	Administrative and clerical expense	Paper and other stock issued, including illustrations ordered, outside purchases vouchered	Reconciliation between issues and orders, and same items computed	Total	Credits by work for other sections	Total cost of production
Job.....	\$226, 141.86	\$6, 197.66	\$31, 488.67	\$78, 678.09	\$4, 695.42	\$19, 058.69	-----	-----	\$366, 260.39	\$31, 557.71	\$334, 702.68
Patents.....	230, 227.81	5, 100.81	32, 852.47	267, 253.56	4, 755.43	20, 445.31	-----	-----	560, 635.39	75, 533.55	485, 101.84
Linotype.....	551, 809.59	1, 772.56	81, 966.45	688, 875.25	11, 061.26	47, 604.72	-----	-----	1, 383, 089.83	106, 266.89	1, 276, 822.94
Monotype.....	945, 787.94	25, 255.67	144, 850.09	1, 183, 643.19	19, 578.11	84, 118.49	-----	-----	2, 403, 233.49	314, 144.81	2, 089, 088.68
Hand.....	326, 773.56	4, 359.95	46, 121.22	73, 099.69	6, 676.19	28, 739.40	-----	-----	485, 770.01	306, 912.99	178, 857.02
Proof.....	987, 805.07	941.18	121, 723.03	17, 878.46	13, 205.52	85, 784.86	-----	-----	1, 227, 338.12	1, 227, 338.12	-----
Apprentice.....	219, 848.74	195.02	26, 873.78	36, 743.81	4, 126.87	20, 035.46	-----	-----	1, 307, 823.68	204, 929.59	1, 102, 894.09
Platemaking.....	216, 458.02	13, 302.67	39, 750.07	26, 479.28	4, 628.13	29, 302.22	-----	-----	329, 920.39	54, 506.89	275, 413.50
Photo-engraving.....	74, 835.96	11, 628.95	12, 178.09	7, 363.36	1, 745.25	11, 043.57	-----	-----	118, 795.18	6, 557.16	112, 238.02
Press.....	981, 602.71	58, 161.00	168, 907.45	98, 644.96	20, 816.43	89, 094.86	-----	-----	1, 417, 227.41	160, 144.35	1, 257, 083.06
Pamphlet binding.....	583, 054.68	4, 102.46	85, 001.28	163, 875.61	7, 726.86	48, 728.01	\$14, 576.17	-----	907, 065.07	951.82	906, 113.25
Ruling and sewing.....	367, 124.02	4, 226.29	55, 467.47	17, 272.46	4, 899.25	34, 307.12	84, 166.69	-----	567, 463.30	3, 670.71	563, 792.59
Forwarding and finishing.....	503, 279.08	15, 440.93	85, 905.86	33, 696.31	6, 884.58	49, 554.43	141, 596.89	-----	836, 358.08	17, 862.60	818, 495.48
Money order.....	45, 202.25	1, 592.39	7, 325.23	902.89	632.74	3, 974.44	61, 164.89	-----	120, 794.83	131.36	120, 663.47
Postal card.....	107, 789.94	52, 883.02	28, 773.68	1, 092.10	2, 317.53	14, 570.03	509, 976.79	-----	717, 403.09	-----	717, 403.09
Library printing branch.....	57, 230.72	712.52	3, 049.33	9, 622.98	1, 189.85	4, 085.43	22, 243.54	-----	98, 134.37	-----	98, 134.37
Library binding branch.....	125, 160.12	122.49	1, 649.41	497.52	1, 649.41	8, 925.24	3, 550.88	-----	146, 677.01	7, 706.08	138, 970.93
Cutting and packing.....	95, 187.37	5, 624.86	16, 838.92	2, 834.03	1, 355.38	8, 766.11	484, 074.36	+\$1, 984.45	616, 665.48	5, 343.90	611, 321.58
Metal.....	23, 257.20	-----	11, 199.21	-----	536.08	2, 754.68	-----	-----	50, 314.53	50, 314.53	-----
Details chargeable.....	25, 260.85	.61	.72	48.00	-----	1, 910.37	66.43	-----	27, 286.98	-----	27, 286.98
Stores.....	139, 765.86	2, 416.52	41, 531.83	5.47	1, 898.64	11, 172.76	-----	-----	196, 791.08	39.89	196, 751.19
Ink.....	12, 273.73	23, 851.62	4, 928.89	-----	537.65	2, 786.91	-----	-----	44, 378.80	44, 378.80	-----
Roller and glue.....	5, 890.16	9, 706.57	1, 864.13	-----	230.13	1, 193.14	-----	-----	18, 884.13	18, 884.13	-----
Paper stock—Press division.....	-----	-----	-----	-----	-----	-----	1, 759, 853.00	+2, 114.84	1, 761, 967.84	-----	1, 761, 967.84
Illustrations.....	-----	-----	-----	-----	-----	-----	131, 633.71	-12, 679.57	118, 954.14	-----	118, 954.14
Outside purchases.....	-----	-----	-----	-----	-----	-----	30, 141.67	+2, 725.94	32, 867.61	-----	32, 867.61
Work for stock returned to stores.....	-----	-----	-----	59, 703.85	-----	-----	-----	-59, 703.85	-----	-----	-----
Light and power for city post office.....	-----	-----	31, 156.58	-----	-----	-----	-----	-----	31, 156.58	-----	31, 156.58
Miscellaneous service for Superintendent of Documents—other than printing and binding.....	-----	7, 845.68	20, 542.51	281.98	1, 742.96	-----	-----	-----	30, 413.13	-----	30, 413.13
Total.....	6, 841, 077.40	278, 698.63	1, 107, 068.31	2, 768, 492.85	122, 889.67	627, 956.25	3, 243, 045.02	-65, 558.19	14, 923, 669.94	2, 637, 175.88	12, 286, 494.06

¹ Total expense of all apprentices.² Total expense of apprentices not detailed to other divisions.

TABLE 7.—Itemized statement of the classes and cost of work delivered during the fiscal year ended June 30, 1929

Kind or description of work	Number of copies	Number of type pages	Publications bound	Charge for composing-room work except author's alterations	Charge for author's alterations	Charge for electrotyping or stereotyping	Charge for pressroom work	Charge for bindery work	Charge for illustrations or engravings	Charge for paper	Charge for rush and overtime work	Charge for miscellaneous items	Total charge
Letterheads, noteheads, and envelopes	114,629,817	-----	-----	\$23,321.96	\$61.70	\$2,383.49	\$58,244.25	\$14,334.55	\$28.00	\$109,993.83	\$148.96	\$290.99	\$208,807.73
Embossed letterheads, noteheads, and envelopes	757,161	-----	-----	44.70	.75	1.50	2,990.81	201.80	-----	3,433.27	113.53	117.17	6,903.53
Blanks, notices, schedules, cards, etc. (including postal cards)	3,167,101,247	-----	-----	385,888.77	16,163.47	35,861.14	404,751.66	355,751.51	7,094.53	1,330,266.30	5,840.47	439,003.37	2,980,621.22
Blank books with patent backs, etc.	13,657	-----	-----	3,734.50	20.25	78.07	1,418.52	25,653.76	-----	3,759.93	-----	.22	34,665.25
Blank books without patent backs	2,940,910	-----	-----	14,592.00	378.61	3,624.77	61,371.85	364,442.17	35.19	113,563.34	37.16	3,592.76	561,637.85
Binding newspapers, documents, reports, etc.	84,332	-----	-----	-----	-----	-----	-----	318,513.04	-----	-----	165.46	-----	318,678.50
Loose-leaf and other patent binders, etc.	1,363	-----	-----	8.55	1.25	-----	8.27	2,853.52	-----	13.97	-----	2,464.31	5,349.87
Publications smaller than octavo	4,083,163	21,110	21,752	30,807.55	3,479.27	3,698.05	10,024.45	26,613.99	2,960.85	11,881.00	1,070.07	71.22	90,606.45
Octavo publications	69,817,652	705,573	670,149	1,771,283.30	115,920.92	134,046.41	329,482.20	616,525.39	121,059.45	435,676.51	157,664.28	1,351.16	3,683,009.62
Royal octavo publications	1,945,558	55,783	57,054	204,509.81	20,024.01	13,747.78	33,830.60	63,597.15	19,267.27	32,268.09	10,387.63	3,209.78	400,842.12
Quarto publications	5,526,362	277,678	44,763	396,826.04	32,986.39	21,453.92	57,068.53	80,892.73	19,592.29	72,682.58	12,594.97	.70	694,098.15
Miscellaneous publications	17,898,197	924,220	272,098	19,046.88	305.59	651.42	74,658.07	222,018.25	17,811.73	142,451.64	388.31	69,422.83	547,654.72
General miscellaneous charges	-----	-----	-----	27,989.00	4,431.42	16,021.65	10,413.47	120,082.72	13,164.83	169,383.86	1,168.12	220,746.90	583,451.97
Congressional Record for year	4,154,804	27,248	82,140	199,597.37	12,999.82	45,080.85	56,449.17	119,734.18	120.98	67,355.99	78,950.95	-----	580,289.31
Bills, resolutions, and amendments (as introduced and reprints on requisitions)	7,171,017	94,157	383	203,128.27	30.45	32.67	67,192.61	15,576.37	-----	11,091.74	95,319.82	-----	392,371.93
Specifications of patents, trademarks, etc.	5,689,408	153,316	-----	703,677.54	8,700.46	17.58	63,560.02	3,737.08	2.00	11,320.84	-----	-----	791,015.52
Official Gazette, Patent Office	316,938	15,804	-----	147,834.33	180.12	-----	22,021.83	18,957.78	17,333.94	22,894.21	-----	-----	229,222.21
Blank paper and supplies	-----	-----	-----	-----	-----	-----	-----	-----	-----	486,062.56	-----	120,042.29	606,104.85
Total	3,402,131,586	2,274,889	1,148,339	4,133,190.57	215,734.48	276,699.30	1,253,486.31	2,369,485.99	218,471.06	3,024,099.66	363,849.73	860,313.70	12,715,330.80

TABLE 8.—Inventory of quantity and costs of paper and envelopes, material and supplies, and machinery and equipment on hand June 30, 1929

Description	Sheets	Pounds	Cost
Paper and envelopes:			
Printing.....	9,875,000		\$91,566.82
Do.....		1,057,000	52,160.60
Mimeograph.....	7,964,000		41,633.41
United States money-order writing.....		101,000	9,647.97
Safety writing.....	95,000		741.11
Writing.....	7,064,000		36,869.95
Do.....		255,000	14,788.00
Map.....	374,000		8,767.18
Manifold.....	7,015,000		38,577.79
Bond.....	14,176,000		127,207.24
Ledger.....	2,847,000		53,032.46
Index.....	572,000		18,139.07
Cover.....	1,112,000		25,052.16
Manila.....	1,449,000		7,557.90
Do.....		171,000	7,437.78
Kraft.....	148,000		10,557.14
Do.....		79,000	3,199.50
Manila tag board.....	298,000		5,784.74
Do.....		257,000	18,431.95
Cardboard.....	170,000		4,595.31
Bristol board.....	484,000		4,631.88
Do.....		453,000	21,889.77
Miscellaneous.....	1,664,000		11,161.87
Do.....		19,000	1,462.50
Binders board.....		586,000	17,665.16
Envelopes.....			17,810.93
Total, paper and envelopes.....			650,370.19
Other material and supplies:			
Miscellaneous supplies.....			199,008.51
Book cloth.....			27,795.12
Ink ingredients.....			7,819.44
Leather.....			8,493.85
Ink (made in Government Printing Office).....			2,967.48
Total, material and supplies.....			246,084.40
Total, material and supplies, paper and envelopes.....			896,454.59
Machinery and equipment.....			4,334,652.87
Grand total.....			5,231,107.46

TABLE 9.—*Publications, including annual reports and documents, printed on requisition during the fiscal year ended June 30, 1929, for Government departments and independent establishments (Congress not included)*

	Copies
State.....	428,356
Treasury.....	3,509,507
War.....	13,853,211
Navy.....	2,143,557
Interior.....	1,984,039
Justice.....	83,395
Post Office.....	1,548,805
Agriculture.....	24,150,059
Commerce.....	5,992,372
Labor.....	1,903,496
Smithsonian Institution.....	175,665
Library of Congress.....	170,907
Executive Office.....	53,148
Pan American Union.....	221,550
Supreme Court:	
District of Columbia.....	174
United States.....	7,182
Court of Claims.....	3,653
Bureau of Efficiency.....	870
Federal Power Commission.....	10,044
Interstate Commerce Commission.....	2,151,107
Civil Service Commission.....	173,417
Geographic Board.....	11,800
General Accounting Office.....	12,741
Allen Property Custodian.....	1,748
District of Columbia.....	167,290
Employees' Compensation Commission.....	70,319
Veterans' Bureau.....	117,349
Federal Board for Vocational Education.....	76,698
Federal Reserve Board.....	423,345
Federal Trade Commission.....	114,266
National Advisory Committee for Aeronautics.....	45,405
Panama Canal.....	5,064
Railroad Administration.....	1,271
Shipping Board.....	470,043
Tariff Commission.....	21,682
Board of Mediation.....	5,099
National Forest Reservation Commission.....	2,000
War Finance Corporation.....	510
Bureau of the Budget.....	26,622
Public Buildings and Public Parks.....	668
Board of Tax Appeals.....	12,154
Pan American Sanitary Bureau.....	83,500
Federal Radio Commission.....	11,378
Inland Waterways Corporation.....	3,501
National Capital Park and Planning Commission.....	3,500
War Claims Arbitrer.....	9,000
Miscellaneous.....	12,930
Total.....	60,274,397

TABLE 10.—*Receipts from miscellaneous sales during the fiscal year ended June 30, 1929*

Condemned material, machinery, etc.....	\$1.00
Waste wood.....	650.38
Waste metal.....	4,985.57
Waste paper.....	39,455.54
Leather scraps.....	10.74
Waste gold.....	286.61
Total.....	45,389.84

DIVISION OF TESTS AND TECHNICAL CONTROL
REPORT OF THE TECHNICAL DIRECTOR

REPORT OF THE TECHNICAL DIRECTOR

The following report covers the work of the division of tests and technical control for the fiscal year ended June 30, 1929, and the calendar year 1929:

The total number of samples analyzed during the fiscal year 1929 was 7,608 compared with 8,138 for the preceding year. The tests include samples of delivered materials, samples offered by bidders, samples for technical control of type metals, inks, glues, etc., and samples for research work.

Following is a tabulation of the various tests of material during the fiscal years 1928 and 1929:

	1928	1929
Paper and paper products, including bid, delivery, and investigational samples.....	5,376	4,800
Textiles, including bookbinding cloths and cordage.....	767	750
Bookbinding leathers.....	94	87
Metals, including technical control and investigational samples of type-metal alloys.....	1,139	1,134
Glue.....	47	51
Ink-making materials.....	288	349
Lubricating oils and greases.....	43	50
Gasoline.....	66	72
Chemicals.....	91	79
Miscellaneous, including soaps, waxes, turpentine, etc.....	227	219
Total.....	8,138	7,608

The decrease of tests in 1929 was due to fewer but larger orders for paper and envelopes and also to the purchase of more paper, glue, and other materials on the Government specifications rather than on bid samples.

Of the 1,134 samples of metal tested during the year, 843 were technical control samples of metal used in the office, 245 were of lino-type and stereotype metals submitted by the American Newspaper Publishers Association, and 46 were of various metals and alloys used in reconditioning type-metal alloys.

As a result of the technical inspection and testing of all deliveries of materials purchased by the office, 255 deliveries were rejected, of which 145 were paper, 31 envelopes, and 79 miscellaneous materials.

PAPER

The number of rejections of paper for the fiscal years 1928 and 1929, all causes being listed, with some deliveries rejected for more than one deficiency, are shown in the following table:

Cause for rejection	1928	1929	Cause for rejection	1928	1929
Not within weight tolerance.....	27	11	Deficient in bursting strength.....	37	31
General appearance.....	13	56	Excessive ash.....	8	12
Unsatisfactory finish.....	18	1	Deficient in absorption.....	0	3
Unsatisfactory opacity.....	3	0	Deficient in thickness.....	6	2
Unsatisfactory color.....	2	1			
Deficient in stock.....	26	9	Total.....	165	151
Deficient in folding endurance.....	25	25			

A total of 46,110,818 pounds of paper was inspected during the year, 1,877,951 pounds of which were rejected. This is approximately 4.1 per cent, or 1.2 per cent less than the previous year, as shown by the following tabulation for 1928 and 1929:

Kind of paper	Inspected		Rejected	
	1928	1929	1928	1929
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Newsprint.....	2,100,020	1,774,749	29,931	42,870
Machine-finish book.....	9,070,857	9,058,500	480,872	174,457
Supercalendered and halftone book.....	4,353,695	3,304,631	178,594	104,403
Coated book.....	718,973	481,973	100,172	276,427
Mimeograph.....	2,727,369	2,742,637	416,200	-----
United States money order safety and writing.....	610,887	556,887	-----	-----
Map.....	357,448	252,578	60,991	23,650
Chart.....	200,081	185,066	-----	1,299
Manifold.....	712,709	708,037	27,006	44,047
Sulphite writing.....	2,546,415	3,100,504	77,681	291,736
Bond.....	5,379,047	5,597,724	195,904	362,679
Ledger.....	686,987	639,125	64,826	7,212
Index.....	292,909	384,110	1,530	35,616
Tissue.....	3,024	9,727	-----	1,800
Cover.....	323,189	303,412	20,184	-----
Wrapping.....	1,523,621	1,584,879	263,936	79,150
Tag board.....	598,183	839,159	55,243	48,704
Manila cardboard.....	39,026	11,206	4,768	-----
Railroad board.....	124,765	100,921	-----	-----
Wood Bristol.....	595,630	885,326	75,704	-----
United States postal-card Bristol.....	10,396,824	11,476,756	216,602	361,885
Miscellaneous.....	128,469	83,772	42,400	3,670
Blotting.....	157,320	202,968	9,672	18,346
News, chip and box board.....	317,640	867,710	1,250	-----
Binders board.....	1,159,153	843,600	16,626	-----
Pressboard.....	42,671	55,158	-----	-----
Total.....	45,196,912	46,110,818	2,400,692	1,877,951

The new watermark proposed by the Public Printer and adopted by the Joint Committee on Printing to indicate the grades of rag-content bond and ledger papers is a decided step toward the standardization of paper based on quality.

KRAFT PAPER

The Government purchases large quantities of kraft paper and envelopes. Therefore, it has been necessary to develop definite specifications to insure quality. The bursting-strength test was formerly the only one used to determine the quality of kraft paper. However this test was not satisfactory, since it did not indicate the desired characteristics of the paper. As a result of research work by the laboratory it was found that the folding endurance better indicated quality. The Government paper specifications for kraft paper now include such requirements. However, since considerable change has taken place in the manufacture of kraft paper in recent years, another investigation was made to obtain more satisfactory tests for quality. Kraft paper manufacturers were invited to furnish samples of standard grades for test purposes. Ninety-seven samples were received from 17 different manufacturers. These samples have been tested for fiber content, ash, weight, thickness, tensile strength, stretch, folding endurance, bursting strength, tear resistance, and porosity. The results will be published later.

BINDERS BOARD

The Government Printing Office purchases annually approximately 850,000 pounds of best quality and No. 2 quality binders board. The Government specifications for binders board up to 1928 were rather indefinite, but as a result of research work, specifications for weight, bursting strength, thickness, density, and general requirements were adopted for the year beginning March 1, 1928.

Like other binderies, the Government Printing Office has been confronted with the warping of book covers. This is a serious difficulty and is most prevalent during the winter seasons. A study of the problem shows that warping is caused primarily by changes in the temperature and relative humidity to which a book may be exposed, usually soon after production. There are several factors which must be considered in a study of this problem—the book cloth, end paper, adhesives, binders board, and atmospheric conditions under which the materials are stored and the cases are manufactured.

A study was made of the various adhesives used, and the percentage of water in each was determined. The water resistance of the binders board and the direction in which to apply the warp of the book cloths and the grain of the end papers were also studied. The least difficulty with warping was experienced with best quality boards which usually contain some rope stock and are rosin-sized and rolled hard. The water resistance of the best quality board was found to be much better than that of the No. 2 quality board.

It was found that No. 2 quality board, when made water-resistant by treatment with shellac, showed less tendency to warp. Based on this theory the Government contractor for No. 2 quality binders board was requested to rosin-size all deliveries of this quality board so as to render it water-resistant. An improvement was noted and, although it is not believed that sizing will entirely eliminate warping, it should assist materially in preventing excessive warping.

Further work is being done in cooperation with the Employing Bookbinders of America, who have assigned a research associate to work with the Government chemists. Members of the Binders Board Association are also cooperating in this work by furnishing samples of their standard grades for test purposes.

NEWSPRINT

During the fiscal year 1928 research work on newsprint paper and news ink was started in cooperation with the mechanical department of the American Newspaper Publishers Association. The progress report on newsprint was presented by the technical director at the mechanical conference of the association in Buffalo on June 11, 1929.

The report is in part as follows:

At the mechanical conference of the American Newspaper Publishers Association held at Cleveland last year, reference was made to an investigation which was being started by the division of tests and technical control of the United States Government Printing Office in cooperation with the mechanical department of the American Newspaper Publishers Association relative to newsprint paper and printing ink. The purpose of this investigation is to determine the essential qualities of newsprint paper and ink, which should be controlled in order to insure uniform quality and to obtain the best and most economical results from a printing standpoint.

During recent years the speed of production of newsprint paper has increased considerably and modern newsprint papermaking machines are to-day producing paper at a speed of approximately 1,000 feet per minute. Likewise the

operating speed of newspaper presses has been increased and to-day approximates 30,000 copies per hour; some presses even producing 40,000 to 60,000 copies per hour. These conditions must be given careful consideration in any investigation of the quality of newsprint paper and ink.

At this meeting only a progress report on the paper investigation will be presented. The results obtained on newsprint ink are insufficient at this time to submit any report.

In order to secure complete and reliable data as to the quality of newsprint paper being used by the newspaper publishers to-day, the members of the American Newspaper Publishers Association were requested by Mr. W. E. Wines, manager mechanical department, during the early part of the year 1928, to submit, for testing, samples of the newsprint paper they were using. In response to this request 256 samples of newsprint paper were received from 149 publishers. The samples submitted represent newsprint produced by approximately 75 different paper mills located in the United States, Canada, and Europe.

The samples of newsprint received have been divided into three classes—standard, special, and colored. The 220 samples of uncolored newsprint which contained less than 2 per cent ash were classed as standard newsprint. Samples of uncolored newsprint containing more than 2 per cent ash were classed as special newsprint and include two samples of rotogravure paper. There are 17 samples included in this classification. The 19 colored samples are classed as colored newsprint. The results of the tests have been printed in tabular form for comparison and will be furnished upon request.

The samples have been kept in the constant temperature and relative humidity room of the Government Printing Office continually since being received. The atmospheric conditions of this room are automatically maintained day and night at 70° F. temperature and 50 per cent relative humidity. All tests on the samples were made under these standard testing conditions. The physical tests for strength were made as soon after receipt of the samples as possible owing to the rapid deterioration which takes place in newsprint paper, due to the high percentage of ground-wood pulp present. The testing of this large number of samples has required considerable work and necessitated the development of certain special tests for determining the relationship of paper to printing ink.

Tests have been made on the samples for fiber content, ream basis weight, thickness, ash, bursting and tensile strengths, stretch, and oil penetration. A number of the samples were also tested for gloss or finish, and porosity or air permeability.

No tests for opacity were made on the samples, since newsprint is one of the most opaque printing papers, and the cause for the showing through of ink is due chiefly to the penetration of the printing ink or the quality of the ink. The opacity of newsprint will be considered, however, in future investigational work.

A study will also be made of various types of testers for measuring the tear resistance of newsprint. Owing to the very low tear resistance of newsprint, it is not possible to measure the tear resistance of a single sheet. Tests were made tearing 4, 8, and 16 sheets of paper at the same time with the Elmendorf tear tester. However, even when 16 sheets were torn simultaneously, the test results were very low and somewhat unreliable.

The test results on the samples reported in the tabulation are the average of a sufficient number of tests to furnish fair and accurate information as to the quality of the various samples submitted.

The following gives a brief summary of the test results on the samples of newsprint:

STOCK OR FIBER CONTENT

The fibrous constituent of newsprint paper is wood pulp made almost exclusively from the coniferous species, such as spruce and fir. The wood pulp is of two kinds, the mechanical or "ground wood" and the chemical or "sulphite."

The "ground-wood" pulp is produced by grinding the wood against rapidly revolving grinding stones without the use of any chemical, only water being used to carry the loosened wood fibers from the grinding stones. This pulp has relatively short fibers but, due to the method of manufacture, has absorptive and other characteristics which are essential in newsprint paper.

"Sulphite" pulp is made by cooking chips of the wood with bisulphite acid liquid at a high temperature and pressure. This pulp has a long and strong fiber and is almost pure cellulose. Most newsprint contains approximately 20 to 30 per cent "sulphite" pulp and the remainder is "ground-wood" pulp.

The fiber analysis showed only eight of the standard newsprint samples to contain over 30 per cent sulphite pulp. The highest sulphite pulp content was 40 per cent and the lowest 15 per cent.

Under the special and colored newsprint the highest sulphite content was 50 per cent and the lowest 5 per cent. Only four samples of the special and colored newsprint samples contained over 30 per cent sulphite, including the samples of rotogravure paper.

The fiber content was determined by the count method and only ground wood and unbleached sulphite (coniferous chemical wood) pulp were found to be present in any of the samples.

ASH

The ash determination furnishes information as to the ash of the fiber itself and any ash from the water, color, alum, sizing materials, or clay used.

The cellulose fiber used in the manufacture of paper contains a small percentage of natural ash, the amount varying according to the particular class of fiber: "Ground-wood" pulp contains approximately 0.8 to 1 per cent ash and unbleached "sulphite" pulp from 0.48 to 1.25 per cent.

The ash of newsprint paper due to the "ground-wood" and "sulphite" pulp, water, alum, color, etc., would be less than 2 per cent.

The ash content of the samples of standard newsprint varied from 0.3 per cent to 2 per cent and that of the special and colored newsprint, not including the two samples of rotogravure paper, from 0.3 per cent to 8.2 per cent. The ash of the samples of rotogravure paper was 18.2 per cent and 14 per cent.

THICKNESS

The results of tests for thickness show considerable variation, ranging from 0.0029 inch to 0.0042 inch for standard newsprint and from 0.0029 inch to 0.0039 inch for the special and colored newsprint not including the two samples of rotogravure paper which were 0.0025 and 0.0028 inch in thickness.

Assuming that the thickness of standard newsprint should be 0.0032 inch and allowing a variation of 0.0002 inch above or below this figure, or 0.0030 to 0.0034 inch, 142 samples, or 56 per cent of the samples, tested are within the maximum and minimum limits. This does not include the two samples of rotogravure paper.

WEIGHT

The basis ream weight for standard newsprint is 24 by 36, 500 sheets, 32 pounds, and allowing a 10 per cent variation, 5 per cent above or below, should be not less than 30.4 pounds nor more than 33.6 pounds.

The results on the samples of standard, special, and colored newsprint, not including the two samples of rotogravure paper, showed a minimum ream weight of 29.6 pounds and a maximum weight of 36.9 pounds. Ninety-two per cent, or 233 samples, were within the 5 per cent variation above or below 32 pounds per ream basis.

BURSTING STRENGTH

The bursting strength of the samples of standard, special, and colored newsprint varied from 7.5 to 13.5 points.

TENSILE STRENGTH AND STRETCH

The tensile strength was measured with a Schopper tensile-strength tester. The strips of paper were cut 15 millimeters in width in both the machine and across machine directions and tested with the clamping jaws set 100 millimeters apart. The test results were recorded in kilograms. These results have also been calculated to tensile strength in pounds on the basis of a strip 1 inch in width. The following give the maximum and minimum tensile-strength tests on the samples tested:

	Kilograms per 15 mm. width		Pounds per inch width	
	Minimum	Maximum	Minimum	Maximum
Machine direction.....	2.08	4.09	7.76	15.24
Across machine direction.....	1.04	2.21	3.88	8.23

The stretch was determined at the same time as the tensile strength and is expressed in per cent. The following are the maximum and minimum results obtained:

	Minimum	Maximum
	Per cent	Per cent
Machine direction.....	0.3	2.8
Across machine direction.....	.6	2.8

RESISTANCE TO PENETRATION BY PRINTING INK

The resistance to penetration of printing ink was determined by measuring the time required for the penetration of castor oil. This test was made by floating a sample 2 inches square on the surface of castor oil under uniform temperature and relative humidity conditions and noting the time required for complete saturation. The sample was exposed with both the wire and felt sides of the paper floated on the oil and the results reported separately in order to determine the variation in oil penetration from the wire and felt sides of the paper.

This test is considered important, as it furnished an indication of the ink-penetration quality of the various samples. The results of considerable investigational work conducted by the technical division of the Government Printing Office on various types of printing papers, including newsprint, machine finish, super-calendered book, and mimeograph paper, indicate that this test furnishes reliable information as to the probable ink penetration of the paper on the printing press or mimeograph machine.

Castor oil is used in making this test since it was found to give results similar to those obtained with the various vehicles used in the manufacture of newsprint ink. Castor oil, United States Pharmacopœia quality, can be readily secured of uniform quality for use in making this test. It is difficult to obtain uniform quality oils and ink-making varnishes for use as a testing medium; due to the rapid penetration of the lighter vehicles, such as mineral oils, it is impossible to obtain a satisfactory end point.

The results on oil absorption showed a wide variation in the resistance of the different samples to the penetration of castor oil. It will be noted that, although there is no uniformity as to which side of the paper is more resistant, the felt side usually possesses the better oil resistance.

The range of oil penetration on the samples of standard, special, and colored newsprint tested is shown in the following table:

	Minimum	Maximum
	Seconds	Seconds
Wire side.....	26	145
Felt side.....	29	296

POROSITY OR AIR PERMEABILITY

The test for porosity on the samples tested was made with a Gurley densometer. This test consists of measuring the rate of penetration of 100 cubic centimeters of air through the sheet of paper. Only a limited number of samples were tested in this respect. It is planned to conduct further tests for this quality, using different types of testing equipment.

It is interesting to note, however, that on the samples of newsprint tested for porosity, the curve of results is similar to the oil-penetration results obtained with castor oil, and it appears that the determination of porosity of newsprint paper may furnish an indication as to its ink-resistant qualities. The range of porosity as shown by the results of tests on all samples was, minimum, 10 seconds; maximum, 360 seconds.

CONCLUSION

This tabulation of test results on newsprint presents a very comprehensive survey as to the quality of newsprint being used to-day by the newspaper publishers. It will furnish an excellent basis for conducting further research on

newsprint in order to determine and standardize the essential qualities which must be controlled to obtain the most satisfactory and economical newspaper printing.

To the publisher, the printing quality of newsprint is the most essential consideration, and this quality is controlled chiefly by finish, thickness, and relationship to newsprint ink. The publisher is interested in the strength of the paper to the extent that it shall possess sufficient strength to give maximum production on the printing presses with a minimum of breaks. From the standpoint of uniformity and cost the control of the basis weight of the paper within a specified tolerance is important.

The difficulty being experienced with penetration of printing ink is probably the most serious. The results of the tests on the samples submitted show a wide variation in oil resistance, and apparently very little attempt has been made on the part of the paper manufacturer to control this property in newsprint. It is not possible, however, to draw any definite conclusions from this tabulation as to the factors which should be controlled in order to obtain the least penetration of the ink, or to set a definite requirement as to this property, without comparative practical printing tests.

The investigation as to oil penetration indicates that the oil follows the spaces between the fibers first and then enters the channels of the fibers. The samples with the highest porosity to air, which is due to the more open formation of the fibers in the sheet, also have the lowest resistance to the penetration of the oil.

If the stock in a newsprint should be refined or jordaned, the formation of the sheet will be closer than if the stock is fed direct to the paper machine from the mixing tanks after being passed through screens. The closeness of the formation of newsprint will depend on the character of the fiber, the addition of clay or loading, the distribution of the fibers on the paper-machine wire, and the speed of the paper machine.

The particles of clay or loading added to paper are of small size and will occupy the spaces which can not be closed up by the larger fibers. Furthermore, clay is not as elastic as the fiber, and after the paper passes through the calendars it will remain in its forced place and close in the sheet; the penetration of oil through the sheet will, therefore, be rendered slower and the resistance to oil increased.

It will be noted that some of the samples of special newsprint containing more than 2 per cent of ash show a better oil resistance than the samples of standard newsprint containing less than 2 per cent ash. However, the fiber in some of these papers indicated that it had been treated differently than in most samples of newsprint and may also account for the lower oil absorption.

The thickness of the samples tested showed considerable variation and the surface or finish showed similar variations. It is evident that paper with a uniform thickness would be most satisfactory. It is customary to state that the thickness of standard newsprint is approximately 0.0032 inch, but further work is suggested before any definite thickness be adopted, and an expression of opinion from both the paper manufacturers and publishers should be secured.

Only a limited number of samples were tested for gloss, all of which showed less than 41.5 per cent. The gloss of the rotogravure sample tested was approximately 60 per cent, which is the average on a supercalendered book paper.

A bursting strength of 10 points is commonly considered the standard for newsprint. However, it will be noted that many samples having a bursting strength below 10 points possess a tensile strength as good or better than other samples having a bursting strength of 10 points or more.

From the results of this investigation it is our opinion that the tensile strength is more satisfactory for measuring the strength of newsprint than the bursting strength and is recommended for consideration in this connection.

One particular difficulty which has been brought to our attention by several newspaper publishers is the contamination of newsprint ink with paper lint. Newsprint is a soft paper, the fibers of which are very easily loosened by slitting or friction on the edge of press bars. Consequently there is considerable paper dust or fiber in the air when a newsprint press is operating at high speed.

It is suggested that if suction boxes were installed at the point of paper slitting, and any other places where paper dust is liberated on the press, considerable of this difficulty could be eliminated. The installation of dust collectors has been observed on rotary presses in England; as a result practically all complaint due to paper lint has been eliminated.

In order to insure the minimum breaks of newsprint paper on a printing press the paper should not contain too low a percentage of moisture. Any paper will be more flexible and will stand more strain without breaking if it contains a reasonable percentage of moisture. Such paper will also give better printing results. For newsprint the best results will be obtained with a moisture content between 8 and 10 per cent.

The work on this investigation of newsprint will be continued during the next year in cooperation with the newspaper publishers and paper manufacturers, and it is hoped to develop a standard specification for newsprint embodying the essential qualities necessary to secure a maximum production of good printing which will be satisfactory to all concerned.

The tests on these samples were conducted by the technical staff of the division of tests and technical control of the Government Printing Office with the assistance, since December, 1928, of a research associate representing the American Newspaper Publishers Association.

ENVELOPES

A total of 40,775,860 envelopes were inspected during the year. The paper qualities varied from wood manila to the highest grades of bond and ledger. The following tabulation shows the total of the various kinds of envelopes inspected during the fiscal years 1928 and 1929, and quantity rejected:

Kind of envelopes	Envelopes	
	1928	1929
	<i>Number</i>	<i>Number</i>
Wood manila.....	1,741,919	1,257,000
Kraft.....	38,693,550	30,387,750
Rope manila.....	480,500	178,110
Sulphite manila.....	115,700	51,250
Sulphite writing.....	3,675,572	7,398,000
100 per cent rag white writing.....	61,000	161,500
100 per cent rag ledger.....	256,039	267,250
50 per cent rag white bond.....	793,884	1,060,000
Colored sulphite writing.....		10,000
Cloth-lined.....	6,500	5,000
Total.....	45,824,674	40,775,860
Total rejected.....	1,503,250	2,114,500

The causes for rejection of envelopes, and the quantities rejected, for the fiscal years 1928 and 1929, are given in the following table:

Cause for rejection	Number of envelopes rejected	
	1928	1929
Paper not within weight tolerance.....	92,000	261,000
Deficient in bursting strength.....	1,142,500	233,150
Deficient in stock.....	85,000	50,000
Unsatisfactory in color.....	20,000	2,500
Unsatisfactory gumming.....	163,750	10,000
Deficient in folding endurance.....		1,557,850
	1,503,750	2,114,500

Experience in the testing of envelopes during the fiscal years 1925 to 1928 indicated that the schedule needed considerable revision and simplification. Accordingly, during the fall of 1928, investigation was made as to the sizes, qualities, weights, and uses of the envelopes:

purchased on the schedule of the Government Printing Office. Specific changes were recommended to the paper specifications committee in revising the Joint Committee specifications for the year beginning March 1, 1929. The recommendations were adopted and the last year there was a decided improvement in the quality and also a material reduction in the number of sizes and weights of envelopes purchased by the office.

The envelope schedule for the year beginning March 1, 1928, provided seven grades of paper—wood manila, kraft, rope manila, white writing, 100 per cent rag writing, 100 per cent rag ledger, and 50 per cent rag bond, the specifications for which have been brought in harmony with the paper schedule.

The largest quantity of Government envelopes are made of kraft paper. The specifications for the year beginning March 1, 1928, provided eight weights of kraft envelopes, substances 32, 40, 48, 56, 64, 72, 80, and 88, three of which, substances 56, 72, and 88, were eliminated. The weights of paper specified for the different sizes of kraft envelopes were also materially reduced.

The office has cooperated with the envelope manufacturers by testing preliminary samples to furnish information as to the new requirements. A decided improvement in the quality of envelopes has been noted.

TYPE-METAL ALLOYS

During the fiscal year 1929 a total of 7,908,788 pounds of type metals of various kinds were standardized for the use of the Government office. This is an increase of 14.4 per cent over the fiscal year 1928.

The following tabulation gives a comparison of the amounts of the various type alloys standardized during the fiscal years 1928 and 1929:

Metal	1928	1929	Increase	Increase
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Per cent</i>
Linotype.....	4,569,855	5,184,345	614,490	13.4
Monotype.....	1,781,210	2,189,734	408,524	22.9
Stereotype.....	367,265	388,870	21,605	5.9
Electrotype.....	¹ 197,420	145,839	² 51,581	² 26.2
Total.....	6,915,750	7,908,788	993,038	³ 14.4

¹ 7 months only.

² Decrease.

³ Average.

The technical control of metals was started in April, 1925. Since that time 27,857,367 pounds of all kinds of type metal have been standardized to the respective formulas.

The tables on pages 116 and 117 show the correction of linotype, monotype, stereotype, and electrotype metals for each month between July 1, 1928, and June 30, 1929, including quantities returned for remelting, correction metals, dross, the percentage increase due to correction, and percentage loss due to drossing, calculated on quantity of metal remelted. Owing to the increased demand for monotype metal it was necessary to convert considerable slug metal and electrotype backing metal to monotype metal. The weight of metal returned for remelting reported also includes the dross.

Linotype metal

Month	Returned for remelting	Correction metal used		Total correction metal used	Total corrected metal	Total dross	Increase due to correction	Dross
		Lead-antimony alloy ¹	Lead					
1928	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Per cent	Per cent
July.....	329,885	685	5,580	6,265	333,565	2,585	1.90	0.78
August.....	542,333	3,795	10,705	14,500	552,450	4,383	2.68	.81
September.....	398,601	2,130	9,190	11,320	406,645	3,276	2.84	.82
October.....	457,797	1,160	4,620	5,780	459,780	3,797	1.26	.83
November.....	359,950	2,175	11,410	13,585	370,410	3,125	3.80	.87
December.....	342,410	1,760	7,730	9,490	349,015	2,888	2.77	.84
1929								
January.....	475,008	4,440	13,030	17,470	488,420	4,058	3.67	.85
February ²	374,774				371,575	3,199		.85
March.....	492,818	3,985	14,305	18,290	507,540	3,568	3.71	.72
April.....	439,795	1,280	7,440	8,720	445,345	3,170	1.98	.72
May.....	500,652	1,185	5,650	6,835	503,835	3,652	1.36	.72
June.....	392,745	1,055	5,010	6,065	395,765	3,045	1.54	.77
Total.....	5,106,768	23,650	94,670	118,320	5,184,345	40,743		
Average.....							2.31	.79

¹ Lead-antimony alloy consists of approximately 60 per cent lead and 40 per cent antimony.

² No correction made, due to lack of correction alloy.

Monotype metal

Month	Returned for remelting ¹	Correction metal used				Total correction metal used	Total corrected metal	Total dross ⁴	Increase due to correction	Dross
		Lead-antimony alloy ²	Tin-antimony alloy ³	Tin	Lead					
1928	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Per cent	Per cent
July.....	175,368	290	3,220	145	-----	3,655	175,655	3,368	2.10	1.94
August.....	206,214	3,045	3,795	815	400	8,055	210,105	4,164	3.90	2.02
September.....	152,450	1,040	1,770	105	-----	2,915	152,165	3,200	1.91	2.10
October.....	232,155	-----	2,585	65	-----	2,650	230,300	4,505	1.14	1.95
November.....	152,975	2,395	660	415	125	3,595	152,895	3,675	2.36	2.40
December.....	169,356	130	1,095	30	800	2,055	167,455	3,956	1.21	2.33
1929										
January.....	177,352	475	2,535	-----	1,645	4,655	177,255	4,752	2.62	2.67
February.....	189,228	-----	3,160	-----	-----	3,160	188,010	4,378	1.66	2.31
March.....	230,753	1,715	3,810	150	-----	5,675	231,300	5,128	2.46	2.22
April.....	219,542	2,045	1,695	503	475	4,718	219,368	4,892	2.14	2.22
May.....	164,012	100	2,020	46	-----	2,166	162,116	4,062	1.32	2.47
June.....	124,760	50	1,020	140	-----	1,210	123,110	2,860	.96	2.29
Total.....	2,194,165	11,285	27,365	2,414	3,445	44,509	2,189,734	48,940		
Average.....									2.02	2.23

¹ This includes 1,980 pounds electrotype metal and 21,200 pounds slug metal.

² Lead-antimony alloy consists of approximately 60 per cent lead and 40 per cent antimony.

³ Tin-antimony alloy consists of approximately 33 per cent tin and 67 per cent antimony.

⁴ This includes all dross from the 129 casting machines, as the skimmings from these are added to the metal returned for remelting.

Stereotype metal

Month	Returned for re-melting	Correction metal used				Total correction metal used	Total corrected metal	Total dross ³	Increase due to correction	Dross
		Lead-antimony alloy ¹	Tin-antimony alloy ²	Tin	Lead					
1928	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Per cent	Per cent
July.....	41,430		325	80		405	41,555	280	0.98	0.68
August.....	10,199		75			75	10,175	99	.74	.98
September.....	30,774	500	100			600	31,200	174	1.95	.55
October.....	68,635	450	250	30		730	69,030	335	1.06	.49
November.....	40,466	725		125	25	875	41,125	216	2.17	.53
December.....	19,705		110			110	19,710	105	.55	.53
1929										
January.....	14,506	50				50	14,475	81	.34	.55
February.....	19,268		100			100	19,250	118	.51	.61
March.....	36,032	335	40			375	36,275	132	1.04	.36
April.....	40,545	125	10			135	40,535	145	.33	.35
May.....	39,854	160				160	39,810	204	.40	.51
June.....	25,651	195		10		205	25,730	126	.79	.49
Total.....	387,065	2,540	1,010	245	25	3,820	388,870	2,015		
Average.....									.98	.52

¹ Lead-antimony alloy consists of approximately 60 per cent lead and 40 per cent antimony.

² Tin-antimony alloy consists of approximately 33 per cent tin and 67 per cent antimony.

³ The dross reported is from the remelting and standardization of the old plates and does not include the dross from the casting pot.

Electrotype backing metal

Month	Returned for re-melting ¹	Correction metal used			Total correction metal used	Total corrected metal	Increase due to correction
		Lead-antimony alloy ²	Lead	Other metals			
1928	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Per cent
July.....	10,789	680	9,920		10,600	21,200	101.5
August.....	9,734	475	8,775		9,250	18,850	95.2
September.....	10,802	850	11,750		12,600	23,200	106.8
October.....	4,845	310	5,190	³ 200	5,700	10,510	117.64
November.....	8,010	650	9,360		10,010	18,020	124.96
December.....	14,875	1,830	23,145		24,975	39,850	167.89
1929							
January.....	3,835	420	5,180		5,600	8,535	169.38
February.....	5,135	200	7,665	⁴ 100	7,965	13,035	155.11
March.....	7,675	810	10,915	⁵ 5	11,730	19,360	152.83
April.....	8,100	860	10,890	⁵ 20	11,770	19,770	145.30
May.....	11,700	1,255	16,795	⁵ 54	18,104	29,804	154.73
June.....	16,626	1,245	16,290		17,535	34,130	105.46
Total.....		112,126	9,585	379	145,839	257,164	
Average.....							130.0

¹ The weight of old metal reported was determined after the copper shells and dross were removed.

² Lead-antimony alloy consists of approximately 60 per cent lead and 40 per cent antimony.

³ Linotype metal.

⁴ Antimony.

⁵ Tin.

TYPE-METAL INVESTIGATION

The type-metal investigation in cooperation with the mechanical department of the American Newspaper Publishers Association has been continued during the year. The conclusions are not as definite as had been hoped for in the beginning. However, the results of this investigation are the only data available on the deterioration of linotype and stereotype metals in service.

The report submitted by the technical director at the mechanical conference of the association in Buffalo on June 13, 1929, is in part as follows:

At the Harrisburg conference of the mechanical department of the American Newspaper Publishers Association, in June, 1927, a paper was presented dealing with the technical investigations conducted by the Government Printing Office, with special reference to the work on type-metal alloys—one of the most important groups of materials used by the printing industry.

In connection with the research program of the Government Printing Office an investigation was planned to determine the following:

- (1) The rate of deterioration, in composition and quality, of type-metal alloys in use.
- (2) The most suitable compositions for these alloys for their respective uses.
- (3) The most satisfactory method of maintaining uniform composition and quality.
- (4) Methods for reducing gross losses to a minimum.

The cooperation of commercial printing plants was desired to obtain a comparison of results in such plants with those obtained at the Government Printing Office. It was believed that the smaller amounts of type metal in use by newspaper plants and the relatively much more rapid turnover would be more productive of results than data from the large stock of type metal in the Government Printing Office with its slow and irregular rate of turnover. As this proposed investigation was of interest to the American Newspaper Publishers Association, the suggestion was made that it cooperate in the work on linotype and stereotype metal. This met with the approval of the association and five newspapers have cooperated in this work. A progress report on the type-metal investigation was presented at the Cleveland conference in June, 1928, and was published in Mechanical Bulletin No. 13.

In order to determine the variations in composition of linotype and stereotype metals in use, it was necessary to make chemical analyses of samples taken at regular intervals from the metal stocks in use by these newspapers. Samples of additions of toning metal were also analyzed as submitted.

The five newspapers submitted samples over varying periods of time between October 10, 1927, and May 1, 1929. In general, samples of metal in use were submitted weekly from the date each newspaper entered upon the work until July 1, 1928, and twice a month from that date until the work was concluded.

The cooperating newspapers and the number of samples submitted by each are given below:

	Linotype	Stereotype
Minneapolis Tribune.....	58	66
Chicago Tribune.....	40	47
New York Times.....	40	37
New York Herald-Tribune.....	36	46
Washington Evening Star.....	55	40
Total.....	229	236

RESULTS OF ANALYSES

Each sample submitted was analyzed, and the percentage of tin, antimony, copper, and lead determined. Tin and antimony determinations were made in duplicate. Copper was present as an impurity only, rarely exceeding 0.08 per cent. In approximately half the samples submitted it was found to be less than 0.05

per cent. While it is considered desirable to keep the copper percentage of linotype metal below 0.05 per cent, it has been our experience that 0.08 per cent will not cause difficulty on the casting machines.

The percentage of lead was determined by difference. Since its function is mainly passive and the percentage necessarily varies as the total of the percentages of the other ingredients change, graphs of its variations were not made.

The percentages of tin and antimony in the respective samples from each newspaper are given on a series of graphs. These graphs have been printed separately, and will be furnished upon request.

The graphs show the general variation in the samples of metal over the period covered by the analyses. In certain instances the abnormal variations can be accounted for by recent additions of new toning metals to the stock of metal in use. In others the cause is apparently nonuniformity in the metal stock as a whole. These variations are probably due to the fact that the toning alloy was added at different times and the composition of the entire stock of metal was not entirely uniform at any one time. Our analyses show only the composition of the metal in use at the time the samples were taken.

However, the graphs fairly represent the normal variations in the percentages of tin and antimony in the linotype and stereotype metals in use by these newspapers. The maximum and minimum, the average over the entire period, and the standard percentages of tin and antimony in the respective type metal of each newspaper are given in the tabulations which follow. The average variation range is, of course, considerably less than that indicated by the maximum and minimum figures.

	Linotype metal, per cent tin			
	Maximum	Minimum	Average	Standard
Minneapolis Tribune.....	3.85	3.25	3.60	4.25
Chicago Tribune.....	4.60	3.35	4.00	4.00
New York Times.....	4.50	3.70	3.90	4.00
New York Herald-Tribune.....	4.15	3.70	3.85	4.00
Washington Evening Star.....	4.65	3.45	3.80	3.75

	Linotype metal, per cent antimony			
	Maximum	Minimum	Average	Standard
Minneapolis Tribune.....	12.45	11.80	12.15	12.00
Chicago Tribune.....	11.60	11.15	11.40	11.00
New York Times.....	11.80	11.25	11.55	11.00
New York Herald-Tribune.....	12.15	11.40	11.7	11.00
Washington Evening Star.....	11.90	11.35	11.65	11.50

	Stereotype metal, per cent tin			
	Maximum	Minimum	Average	Standard
Minneapolis Tribune.....	7.45	5.45	6.65	7.00
Chicago Tribune.....	5.30	4.80	5.00	5.00
New York Times.....	6.40	4.50	5.15	5.00
New York Herald-Tribune.....	5.40	4.35	4.75	5.00
Washington Evening Star.....	5.40	4.25	4.85	5.00

	Stereotype metal, per cent antimony			
	Maximum	Minimum	Average	Standard
Minneapolis Tribune.....	14.15	12.65	13.45	14.00
Chicago Tribune.....	14.05	13.35	13.70	15.00
New York Times.....	14.55	13.00	13.95	14.00
New York Herald-Tribune.....	14.05	13.05	13.50	13.50
Washington Evening Star.....	14.85	13.30	14.15	14.00

¹ Changed to 6 per cent Dec. 13, 1928.

LINOTYPE METAL ANALYSES

During the entire period the percentage of tin in linotype metal of each paper varied over a range of approximately 0.5 per cent; the larger variations being caused by additions of new metal. One change in particular—that of the tin in the Washington Star metal in June, 1928—was caused by the addition of too much toning metal, which increased the tin above the intended percentage. At that time they were using a toning metal containing a high percentage of tin. Due to the pressure of the other work, the analyses were not made as soon as the samples were received. When the analyses were made, it was found that too much toning metal had been added.

The percentage of antimony will be found to vary over a smaller range than the corresponding tin percentages, giving a somewhat smoother graph. There are no significant changes shown on these curves.

Two newspapers allowed their linotype metal to go without additions for a definite period of time. The Minneapolis Tribune made no additions to its stock over a six-month period, from October 1, 1928, to April 15, 1929. (Sample for October 1, 1928, was lost in the mail.) The New York Herald-Tribune made no additions to its stock over a 3-month period, February 4 to May 9, 1928, and also over a 4-month period November 1, 1928, to March 1, 1929.

In the 6-month period (October 15 to April 15, 1928) the tin content of the Minneapolis Tribune metal decreased steadily from 3.8 per cent to 3.25 per cent. The antimony varied irregularly between 11.95 per cent and 12.3 per cent. It was 12.1 per cent at both the beginning and the end of the period.

During the 3-month period (February 4 to May 3, 1928) the New York Herald-Tribune metal showed variations in tin between 3.8 per cent and 4 per cent. The slight increase in tin content and decrease in antimony content during the second week point to an addition of new metal which had not become uniformly mixed throughout the stock. The antimony fluctuated rather erratically and showed no regular rate of change between the initial 12.15 per cent, the low 11.55 per cent, and the final 11.95 per cent. During the 4-month period from November 1, 1928, to March 1, 1929, the tin content of this metal dropped from 3.95 per cent to 3.7 per cent. The antimony content showed the usual irregularity, varying from the initial percentage of 11.45 to 11.6 per cent and finally 11.65 per cent.

From February 1 to May 4, 1928, the Washington Evening Star made no additions to its linotype stock other than 4,000 pounds of new metal which was stated to be of approximately standard composition. This metal was added gradually during the entire period in order to offset the weight of metal lost by dressing. This addition partially nullified the value of this period in comparison with those given above. However, the graphs showing the percentage of tin and antimony are in general accord with those of the similar periods with the Minneapolis Tribune and the New York Herald-Tribune.

A slow but definite tendency toward a loss of tin and an irregular tendency of the antimony to remain approximately constant seem to be the only conclusions which can be drawn from these results. The decline of the tin content was relatively larger during the first two months of the period, suggesting that recent additions of new metal had not become thoroughly diffused throughout the stock.

The fluctuations in the percentage of tin in the linotype metal of the Chicago Tribune during the first few months of the investigation were undoubtedly due to additions of new metal, of which, inadvertently, no records or samples were sent.

A sample of type cast by the Minneapolis Tribune about April 15, 1929, from linotype metal containing 3.25 per cent tin and 12.1 per cent antimony was sent in for examination as to the quality. This was at the end of the 6-month period during which no additions were made. They reported that this type was entirely satisfactory for use in newspaper work. However, we are of the opinion that the tin content of this metal was near the danger point. Otherwise, no samples of metals which gave trouble or were of especially good quality were submitted. It is therefore impossible to make any recommendations from this work as to the absolute minimum percentages of tin and antimony necessary to give a good linotype slug. All of the linotype compositions in use by the cooperating newspapers gave satisfactory results as far as could be determined from the information furnished.

STEREOTYPE METAL ANALYSES

No marked changes in the tin content of the various stereotype metals occur which are not traceable to additions of new metal. In December, 1928, the

Minneapolis Tribune made an effort to increase the composition of its stereotype metal to the standard of 7 per cent tin and 14 per cent antimony, which accounts for the abrupt rise noted in each instance. Since, then, in spite of additions, there has been a gradual but steady decline in the percentages of both tin and antimony.

The percentages of both tin and antimony in the Chicago Tribune and New York Herald-Tribune stereotype metals remained quite constant within a narrow range due to the additions of toning alloys.

The New York Times, in December, 1928, increased its standard for tin in stereotype metal from 5 per cent to 6 per cent and made a large addition of new metal to effect this purpose.

After the period from February 1 to May 1, 1928, during which no additions of new metal were made, the Washington Evening Star kept the tin content within narrow limits. The percentage of antimony, after an addition of high antimony toning metal which raised it above the standard, returned to approximately the standard of 14 per cent. Since July 19, 1928, the Star has made regular weekly additions of 400 pounds of new metal to the stereotype metal. This new metal has a specified composition of 8 per cent tin, 14 per cent antimony, and 78 per cent lead. This addition has maintained the tin content within rather narrow limits, but the antimony content has been slowly lowered. This is probably due to the addition of the metal recovered by sweating mixed linotype and stereotype drosses to the stereotype metal stock.

On one or two occasions the Washington Star submitted samples of stereotype metal with which trouble had been experienced. In one instance it was believed that the addition of new metal had increased the "sinks" in the plates. Analysis of this metal showed 5.1 per cent tin and 14.5 per cent antimony. The composition of the metal was therefore not at fault.

None of the newspapers, except the Washington Evening Star, was able to allow the stereotype metal stock to continue in use for three months without additions of new or toning metal. From February 1 to May 1, 1928, no additions of new metal were made to its stock. However, the practice of adding the recovered metal from the combined linotype and stereotype dross to the stereotype metal made it impossible to consider this as a period of no additions. It is interesting to note the decline in the percentage of both tin and antimony during this period. This decline was no doubt caused to a considerable extent by the additions of recovered metal as previously stated.

DROSS

The question of methods of reducing dross losses to a minimum was not investigated from a newspaper standpoint. The following data, collected in connection with the Government Printing Office investigation, may be of interest:

During the year several materials were used in an attempt to reduce dross losses of linotype metal at the Government Printing Office. The materials listed below were burned on the surface of the linotype metal at a temperature of 600° F. just prior to skimming. The quantity of each material used was approximately one-third of a quart for each 5-ton lot of metal. The percentage of dross also includes the dross removed the following morning after the metal was allowed to cool slowly overnight to permit the copper to come to the top.

Number of lots tested	Material	Per cent dross	Number of lots tested	Material	Per cent dross
12.....	Light machine oil.....	0.78	12.....	Castor oil.....	0.84
12.....	Mutton tallow.....	.80	12.....	Beef tallow.....	.86
20.....	Japan wax.....	.81	12.....	Palm oil.....	.88
12.....	Lard oil.....	.82			

There is apparently no material difference in the comparative value of these oils. However, further tests will be made in this connection.

A machine for recovering "shotted metal" from dross at a temperature not exceeding 700° F. is now being tried out. The machine consists of an inclosed cast-iron pot heated by a gas burner, and is operated at a temperature between 600° and 700° F. There is a stirrer which rubs the dross against the heated walls of the pot, allowing the unoxidized metal to melt and flow to the bottom, where it is drawn out. It is not believed that it would be suitable for use where the amount of dross is small or where there is no chemical control to care for

the changes in composition brought about by adding the reclaimed metal to the pot. The recovered metal should be analyzed in order to insure that its addition will not interfere with the composition of the standard metals; or, if it does interfere, the alloy should be returned to standard composition by the use of correction metal.

Results obtained over a period of two months show a recovery of approximately 65 per cent of unoxidized metal from linotype dross and approximately 50 per cent of metal from monotype dross. No tests have as yet been made on stereotype dross. We were surprised at the high percentage of recovery since the dross was carefully removed in order to include the minimum amount of shotted metal.

Analysis of the metal recovered from the linotype dross showed it to be lower in tin content and of approximately the same antimony content as the metal from which it was removed. The metal recovered from the monotype dross was lower in both tin and antimony content than the metal from which it was removed.

The following are analyses of average lots of recovered metal compared with our standard formula metals:

Linotype metal recovered			Monotype metal recovered		
	Standard	From dross		Standard	From dross
	<i>Per cent</i>	<i>Per cent</i>		<i>Per cent</i>	<i>Per cent</i>
Tin.....	4.4	3.55	Tin.....	7.3	5.22
Antimony.....	11.5	11.8	Antimony.....	16.8	14.8
Copper.....	.08	.09	Copper.....	.12	.14
Lead.....	84.1	84.56	Lead.....	75.9	79.84
	100.00	100.00		100.00	100.00

CONCLUSIONS

It has proved difficult to draw any general conclusions from a study of the graphs. No evidences of unusually good or bad type have been submitted with which to relate the variations in composition. It appears that each of the type metals has given satisfactory service under the individual conditions of use. It can, therefore, be concluded that there is a range of composition, within which the percentages of tin and antimony of these respective type metals fall, which will give satisfactory service. From the results of the analyses it was impossible to decide whether or not the limits of these ranges were reached in any of the samples submitted. However, these graphs show the uniformity of composition in type metal maintained by these newspapers under the direction of the metal supply companies. The toning systems hold the metal stocks quite constant considering all the variable factors that tend to modify the composition.

The composition of the type metals can be satisfactorily maintained by any of the methods used by these five newspapers. The toning system appears to hold their essential metals (tin and antimony) within the desired range and to replace the amount of metal lost by drossing. The method to be used by any paper or printing plant should be determined by the conditions in the plant, whether it is desired to increase or decrease the metal supply or maintain it at a constant amount.

One other conclusion can be drawn in this connection. The chief losses due to dross on linotype metal occur in the remelting process and not on the casting machines. The surface of metal exposed on the linotype machines is very small and the temperature is usually controlled around 500° to 530° F. Under these conditions practically no dross loss takes place. When the metal is melted in remelting pots holding from 1,000 to 10,000 pounds, the entire surface of the metal is exposed to oxidation and in many cases at a temperature considerably higher than that in the pot of the casting machine. The temperature of these remelting pots should be automatically controlled and not allowed to go over 600° F. at any time unless special toning metals which might require a higher temperature are being added.

This point is strikingly illustrated by the experience of one of the newspapers that is cooperating in this work. Its remelting pot was being operated without automatic gas control and without a thermometer. No record of the temperature at which this pot was operated was available. We placed a recording pyrometer in the pot, locked the door and covered the glass so the operator did not know the temperature at which the pot was being operated, operation of the pot was continued as before. When removed, the chart showed that the temperature had been as high as 940° F., the average being between 700° and 800° F.

This shows clearly the importance of temperature control on any pot where type-metal alloys are heated. With automatic temperature control on the remelting pots the dross loss and the consequent loss in tin and other ingredients in the metal will be reduced to a minimum.

This work also indicates that the analysis of linotype metal once in three months should be sufficient. However, analysis once a month would be desirable. The decline of only 0.5 per cent in tin content in three months is much less than we anticipated when this work was started.

INK SECTION

The production of printing ink for the fiscal year 1929 was 162,135 pounds, an increase of 12,505 pounds over that for 1928.

Although the testing section was established in 1922, little technical work was done by this office on the manufacture of printing ink until 1924, when the ink section was placed under the control of the laboratory. The first work was the development of specifications for all raw materials used in the manufacture of ink. This was followed by work on formulas for several special inks, such as addressograph, stencil, and mimeograph.

Mimeograph ink has become an important product, a total of 35,066 pounds being made in the fiscal year 1929. During the last three years the office produced 83,165 pounds of mimeograph ink, with a commercial value of \$124,747.50. This ink was furnished to the various Government departments at a charge of approximately \$50,000, with a saving to the Government of \$75,000.

Efforts to reduce waste ink in the pressroom have been continued. Previous to September, 1928, waste ink was used in the manufacture of news and book inks. However, considerable difficulty was experienced with these inks due to variations in quality. The waste ink now being returned to the ink section is unfit for reclamation and is discarded. The total amount of waste ink for the fiscal year 1929 was 3,710 pounds or 2.29 per cent of the total production. This is a material reduction from the preceding year, in which 5,606 pounds of waste ink were returned.

The manufacture of bindery ruling inks was transferred to the ink section.

Inks were developed at the request of the Post Office Department and the Department of Agriculture to meet certain special requirements.

Due to the increase in the ink requirements of the office and the wider use of better quality inks, which require finer grinding, a 4-roll mill has been added to the equipment of the ink section.

Technical control of the manufacture of ink and the standardization of the formulas have resulted in a decided improvement in the quality of the inks used by the Government Printing Office.

PRESS ROLLERS

There were 3,254 press rollers manufactured by the office during the year. In the previous year 3,109 were used by the office.

Research was started to determine the comparative life of rollers made from different grades of glue, the value of glycerin substitutes, and other points of interest to printers. The test rollers were made from all new material, using both glycerin and glycerin substitutes with two qualities of glue. A report will be made after the tests have been completed.

GLUES

The following table shows the amount of each kind of molded glue manufactured during the fiscal year 1929:

Kind of glue composition

	Pounds
Formula A (flexible glue for handwork)-----	28, 080
Formula B (flexible glue for quick-setting machine work)-----	16, 500
Formula C (flexible glue for perfect binder)-----	4, 708
Formula D (tablet composition for handwork)-----	3, 000
Formula E (for reducing the flexibility of flexible glues)-----	4, 680
Formula F (for use on case-making machines)-----	18, 360
Formula G (for cabinetmaking)-----	923
Formula H (tablet composition for use on perfect binder)-----	1, 500
Canceling stamp composition for Post Office Department-----	1, 205
	<hr/> 78, 956

The use of beta naphthol as a glue preservative has been continued with satisfaction. Following the announcement of the value of this material in a previous report, numerous commercial glue preservatives have been sold under various designations. Those examined by this laboratory have proved to be either beta naphthol or related compounds.

The formulas adopted for molded glues have proved satisfactory and their use has been continued without change except for the perfect binder glue. As a result of mechanical improvements by the office, it was found possible to use a more flexible glue on the perfect binder, resulting in a considerable improvement of the finished work. After an investigation in which numerous formulas were tested the following was adopted as giving good results for perfect binder work:

	Per cent
Glue No. 3-----	40. 0
Glycerin-----	33. 2
Water-----	26. 6
Beta Naphthol-----	. 1
Terpineol-----	. 1
	<hr/> 100. 0

Glue-glycerin ratio, 1.2 to 1.

Although containing a high percentage of glycerin, this glue was found to work satisfactorily even under conditions of high temperature and relative humidity.

SUPPLIES TO OTHER GOVERNMENT AGENCIES

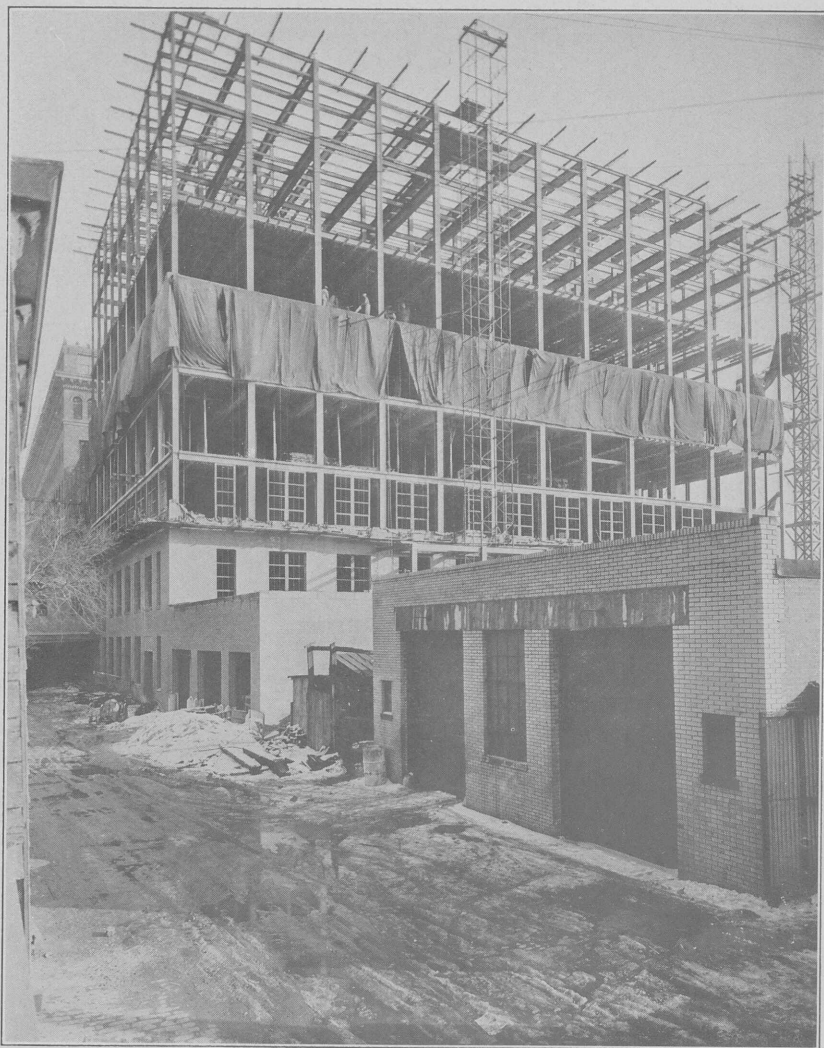
Furnishing miscellaneous supplies manufactured by the Government Printing Office to the various departments and independent establishments of the Government in accordance with Public Act 222, Sixty-ninth Congress, has become an important part of the work of the division of tests and technical control.

The quantities furnished have shown an appreciable increase each year since the act became effective July 1, 1928. The following table shows the quantities of the different supplies furnished to the various Government agencies for the fiscal years 1928 and 1929:

Kind of material	1928	1929
Mimeograph ink, black.....pounds..	29,783	33,963
Printing inks, including multigraph, black and colored.....do....	3,806	3,602
Addressograph ink, blue and black.....do....	326	227
Blue-black writing ink.....quarts..	7,261	8,015
Red writing ink.....pints..	3,319	4,150
Stamp-pad inks, blue, black, and red.....pounds..	666	813
Numbering-machine inks, blue, black, and red.....do....	160	118
Molded glue, including canceling-stamp composition for the Post Office Department.....pounds..	2,450	3,110
Paste.....do....	10,370	13,182

The total charge to the various Government agencies by the Government Printing Office for the supplies this year was approximately \$25,500. It is estimated that the same quality of materials, if purchased through former sources of supply, would have cost approximately \$61,500. For the first year (1927) that printing supplies were furnished by the Government Printing Office a saving of \$20,100 was effected, for the fiscal year 1928 the saving was \$32,100, and for the fiscal year 1929 it was \$36,000, making a total saving to the departments of approximately \$89,000 for the three years. The quality of the various supplies furnished by the Government Printing Office is fully equal and in some cases superior to that formerly obtained from other sources.

The division of tests and technical control at the end of the fiscal year 1929 comprises four sections, the technical laboratory (formerly the testing section), the ink section, the metal section, and the roller and glue section, with a total of 37 employees and a total annual expenditure of \$159,065.38 for labor and materials. The technical laboratory alone now has 19 employees and the expenditure for the past year was \$45,487.92. For salaries and equipment the total expenditure for 1923, the first full year of the testing section, was \$12,473.05.



NEW EXTENSION OF THE GOVERNMENT PRINTING OFFICE

Rear view showing condition of 8-story building and garage, December 26, 1929.

The 1-story structure at the extreme right is not Government property